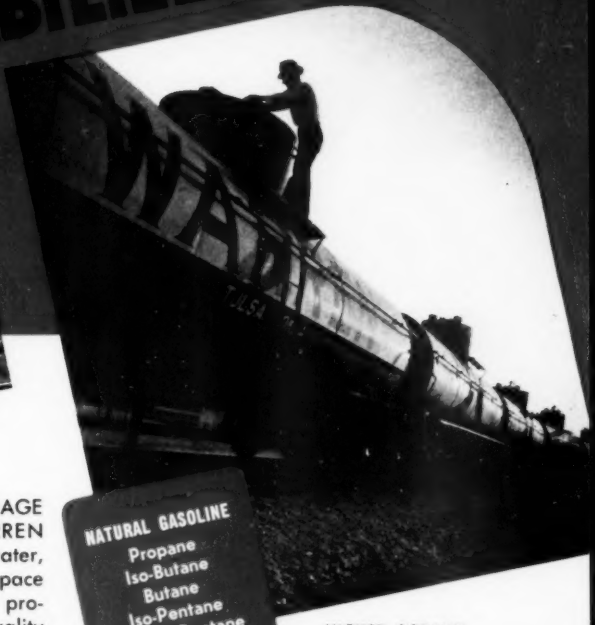
# the OIL AND GAS JOURNAL



## On the GO!

## WARREN'S STABILIZED NATURAL GASOLINE and STA-VOL-ENE



With greatly expanded PRODUCTION, STORAGE and TRANSPORTATION facilities, WARREN PETROLEUM CORPORATION is geared for greater, quicker service to enable refiners to keep pace with modern motor fuel demands. WARREN provides a constant supply and a consistent quality of Stabilized Natural Gasoline and Butane where and when you want it.

**We manufacture special high octane blending agents which command higher prices but will help solve your octane problems.**

**NATURAL GASOLINE**
Propane
Iso-Butane
Butane
Iso-Pentane
Normal Pentane
Hexane
Heptane
Heavy Naphtha
**STA-VOL-ENE**

HIGHER OCTANE
QUICKER STARTING
LOWER FRONT END
GREATER SPEED
GREATER VOLATILITY
SMOOTHER ACCELERATION

## WARREN PETROLEUM CORPORATION

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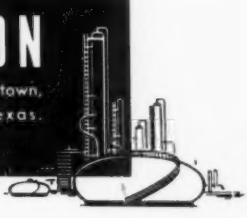


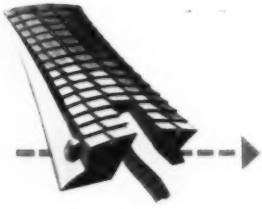
*Crude Oil, Natural Gasoline and Liquefied Petroleum Products*



**PRICE 50 CENTS** TABLE OF CONTENTS PAGE 43 **SEPTEMBER 27, 1951**

# What about these new improvements in Lane-Wells Packers?

## Are they part of Engineered Packer Service?



**NEW "SLYDEZE" SLIPS**

**BOCI PACKER**

*Tomorrow's Tools -Today!*

They certainly are—even though not listed in Engineered Packer Service 7-Point program. It hardly seemed necessary to say that Lane-Wells is, naturally, always working to improve its equipment and services. But "Packer Development" *could* be listed as the *8th* point, as these two examples show:

After many months of experiment and tests, a way was found to give the backs of Lane-Wells slips a permanent, practically friction-free surface. Field tests show that these SLYDEZE SLIPS release freely even under severe service conditions.

For formation fracturing, secondary recovery or pressure acidizing —any job which concentrates tremendous pressure below the packer— these new BOCI Packers do a wonderful job. They set by *tension* . . . hence, the greater the pressure below, the tighter these packers set. They release easily, too.

***Ask your Lane-Wells Man*** for more information on these, or on the already-famous 7 points—1. Packer Application. 2. Packer Selection. 3. Packer Set-ups. 4. Packer Setting. 5. Packer Pulling. 6. Packer Evaluation. 7. Packer Maintenance—which make up the free advisory service widely known as

by LANE WELLS

General Offices and Plant: 5610 So. Soto St., Los Angeles 58, California
Lane-Wells Canadian Co. in Canada
Petro-Tech Service Co. in Venezuela

# His Records Prove It's Good Wire Rope

This man knows that his Bethlehem rope is giving him a good return on every dollar it cost him.

He isn't just guessing. He keeps records on the doings of all his wire ropes; figures that tell him the date they go to work, how much they accomplish, and when they're replaced. From his figures he can see which brand is *doing the most* for him over a period of time. He doesn't rely on general impressions or rough estimates. He *knows!*

Bethlehem urges that all users of wire rope do likewise—keep records of wire rope performance, expressed in units of work. How many ton-miles a rope accounts for; how many yards of rock it moves, how many cars of coal it hauls up a slope, etc. By doing so, the user can compare one brand against another; see for himself which brand is costing him the *least* for the actual work it does.

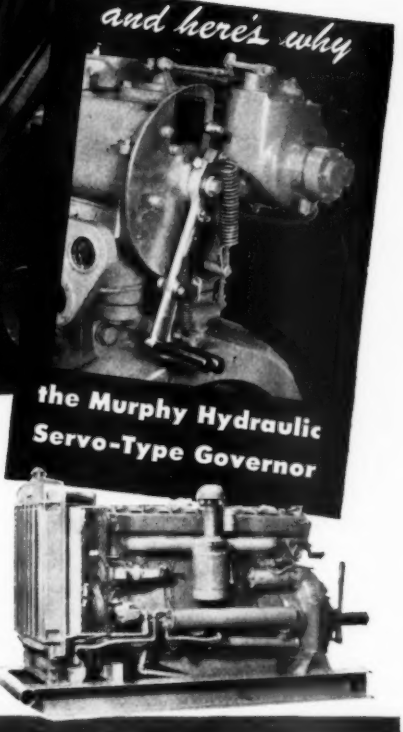
We know that in any such comparisons, Bethlehem wire rope will prove an outstanding value. Stack it against the field; keep your own figures. They'll tell you, in black and white, that a dollar invested in Bethlehem rope buys a mighty big dollar's worth of service.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

*Export Distributor:* Bethlehem Steel Export Corporation

**LET YOUR RECORDS TELL YOU!**

# MURPHY DIESEL'S *Quick responsiveness pays off* when making hole




ONE of the most important characteristics of a really good drilling engine is its ability to take hold of a load and hold on without missing a beat . . . and that's just the characteristic of Murphy Diesels that so many drillers praise. Grant Hill, a driller on the Murphy powered Merline Drilling Company rig illustrated above says these Murphy Diesels are the most responsive power he's ever operated.

Murphy's quick responsiveness to load changes is the result of an integral hydraulic servo-type governor and other design features all of which are described in the informative booklet "*10 Questions to Ask a Diesel Engine Salesman*". Ask your Murphy Diesel Dealer for a copy or write direct.

**MURPHY DIESEL COMPANY**
**5305 W. Burnham St.**
**Milwaukee 14, Wisconsin**

**OIL INDUSTRY FACTORY BRANCH**
**Sales, Parts and Service:**
**113-117 South Elwood Street, Tulsa, Oklahoma**

MURPHY DIESEL

***Heavy duty power* for the oilfields**

**Murphy Diesel Engines and Power Units for drilling and pipe line pumping, 90 to 226 H.P., 1200 and 1400 RPM. Generator Sets, 60 to 140 K.W. Dual-Fuel Engines, 135 to 180 H.P. Also Crude Oil Burning Engines.**

**See Your Murphy Diesel Dealer**

| | | | | |
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| SAN ANTONIO, TEXAS<br>J. E. Ingram Equipment Co. | AMARILLO, TEXAS<br>Service & Supply | JACKSON, MICHIGAN<br>Utility & Industrial Supply | HOUSTON, TEXAS<br>Houston Engine & Pump Co., Inc. | GREAT BEND, KANSAS<br>Manufacturers Dist. Co. |

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

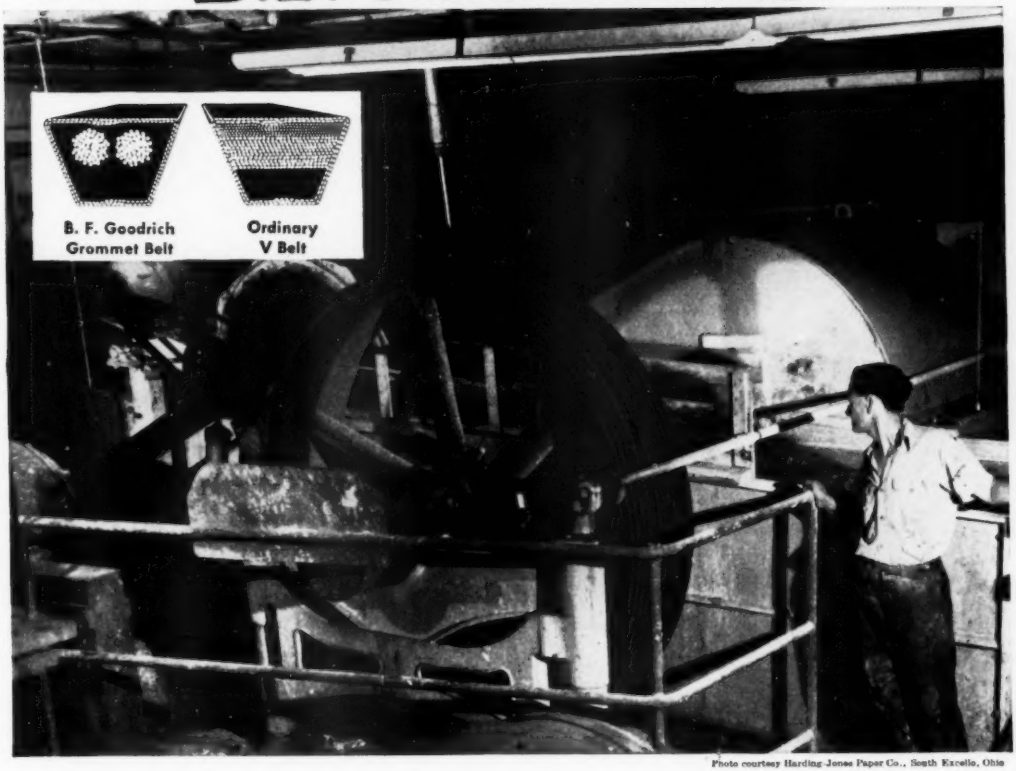



Photo courtesy Harding-Jones Paper Co., South Excello, Ohio

# Drive headache cured with B. F. Goodrich grommet belts

## *B. F. Goodrich grommet V belts cut costs 20 to 50%*

HERE was one of the biggest drive problems in this plant. The machine shown in the picture runs 24 hours a day, 7 days a week. Belts previously used couldn't handle the job. Motor bearings were burning out, belts were snapping under the shock load.

Then a B. F. Goodrich distributor suggested grommet belts to stand the jerks and hard pulls. Installed nine months ago, B. F. Goodrich grommet belts are still going strong, and look good for many more months of use. Here's why BFG grommet belts give longer service, save maintenance costs:

***Endless*** — A grommet is endless, made by winding heavy cord on itself to form an endless loop. It has no overlapping cord sections. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless grommet belt eliminates such failures.

***Concentrated cord strength*** — All of the cord material in a B. F. Goodrich grommet belt is *concentrated* in twin grommets, positioned close to the driving faces of the pulley. No layers of cords to rub against one another, and generate heat; cord and adhesion failures are reduced.

***Better grip, less slip*** — Because a grommet is endless, a grommet belt is more flexible, grips the pulleys better. Size for size, grommet belts will give ⅓ more gripping power, pull heavier loads with a higher safety factor.

***Only B. F. Goodrich makes the grommet!*** — No other multiple-V belt is a grommet belt (U. S. Patent No. 2,233,294). Now available in C, D and E sections. See your local B.F.Goodrich distributor. Ask him to show you his "X-ray" belt that illustrates grommet construction clearly. *The B.F.Goodrich Company, Industrial & General Products Division, Akron, Ohio.*

*Grommet Belts* BY

**B.F.Goodrich**

**RUBBER FOR INDUSTRY**

# —up to 50 HP

## ...now available in new, larger "OILWELL"-LORAIN ENGINES

**Gas or Diesel**
**Single Cylinder**
**Slow Speed**

**Model "A" 13" x 13" Gas or Diesel Engine**
. . . with operating range from 32.2 HP at 185 rpm to 50 HP at 300 rpm

**Model "R" 12" x 13" Gas Engine**
. . . with operating range from 27.4 HP at 185 rpm to 40 HP at 300 rpm

### The "True Story" of Lorain Engine No. 100

On November 9, 1946, this Model "L" Lorain Gas Engine was placed in service near Reed City, Michigan; where it remained until June 20, 1951 when it was re-installed on another well.

It was driving an "Oilwell" TC-23 Pumping Unit which produced approximately 300 bbls. of brine water and 5 bbls. of oil per day . . . pumping a 3600′ well, equipped with $2\frac{1}{4}$" subsurface pump in $2\frac{1}{2}$" tubing. The engine operated continuously at approximately 485 rpm and the pumping unit was set for 54" stroke lengths at 19 strokes per minute.

At the time of relocation this engine had been operating 24 hours per day since its installation over $4\frac{1}{2}$ years ago with only approximately 3 days shut-down time—or a net total of 1682 operating days.

**THE MAINTENANCE RECORD FOR THIS ENGINE FOR THE ABOVE PERIOD IS:**

**May 31, 1948**—5 Piston Rings and 1 Cylinder Head Gasket

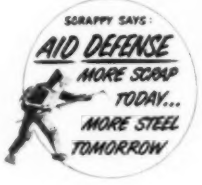
**November 13, 1948**—1 Radiator Core

**April 25, 1950**—5 Piston Rings, 1 Cylinder Head Gasket and 1 Connecting Rod Bearing.

### These new models

. . . extend the line of "Oilwell"-Lorain Engines to include four sizes in Gas Engines and three sizes in Diesels . . . providing an over-all horsepower range from 10.7 to 50 under continuous operating conditions.

If you are interested in gas or diesel prime movers within this performance range . . . ask your "Oilwell" Representative for Engine Booklet No. 16-51 and . . . GET THE FACTS ON "OILWELL"-LORAIN OILFIELD ENGINES.

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USS TRADE MARK

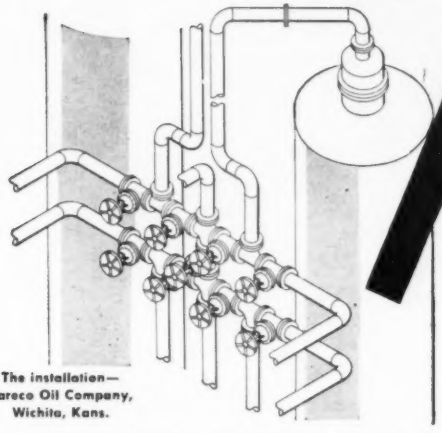
**"OILWELL"** TRADE MARK

UNITED STATES STEEL

# for outstanding service

## on Gasoline Desulfurization

## ...for example



The installation—
Barsco Oil Company,
Wichita, Kans.

**PROBLEM:** To select valves that would stay absolutely tight on hot gasoline, steam-air mixture, and catalyst regeneration waste gases, for control manifold to reaction chambers on Perco Cycloversion unit.

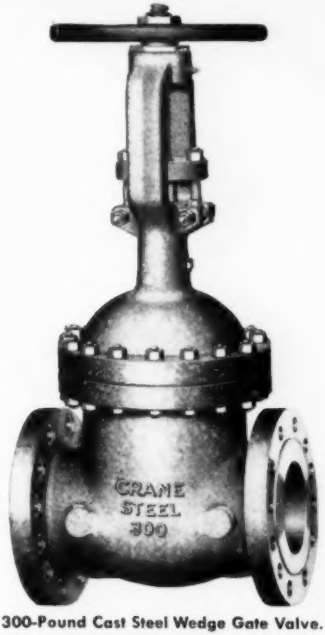
**WORKING CONDITIONS:** Cyclic operation; approximately 15-day cycles. At oil inlet, straightrun gasoline handled at 950 Deg. F., 85 psi. For catalyst regeneration, air-steam mixture at 850 Deg. F., 15 psi. Regeneration waste gases, 1200 Deg. F., 5 psi.

**SOLUTION TO PROBLEM:** Crane 8-inch, 300-Pound, No. 5 Chrome-Molybdenum Alloy Steel Wedge Gate Valves, with Stellite seats and patented flexible disc design.

**RESULTS:** After more than 2 years' service, all Crane valves are absolutely tight and operating at highest efficiency, with no maintenance.

**ANOTHER TYPICAL CASE HISTORY, demonstrating the low ultimate cost of Crane Valves of every type. And the reason why . . .**
**More Crane Valves are used than any other make!**

## . . . Equip with Dependable Quality CRANE VALVES




**300-Pound Cast Steel Wedge Gate Valve. In body and trim materials for all refinery services. See your Crane Catalog.**

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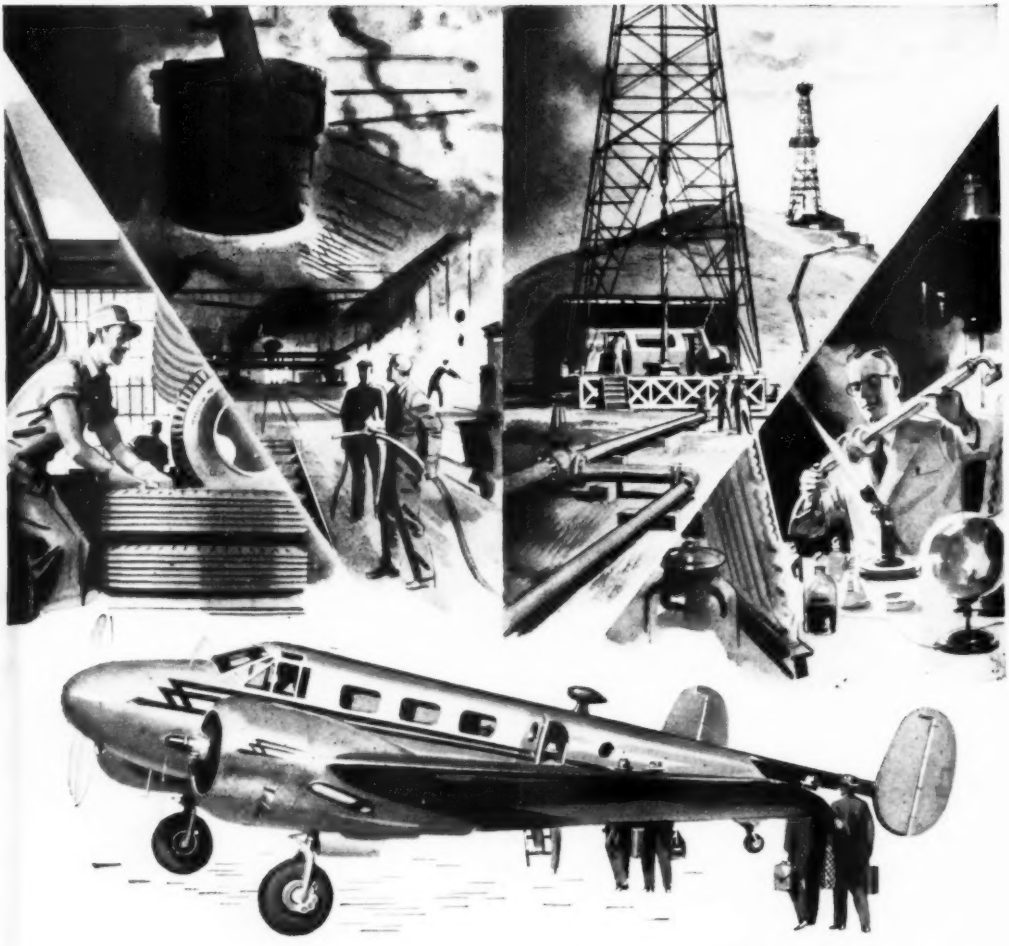

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When a company-owned Beechcraft turns travel days into travel hours, management's "personal touch" re-enters the picture. When key men travel at 200 mph, they can afford to travel more. Efficiency is higher because management *knows* what's going on. This is why so many Beechcrafts serve America's industrial giants—steel, rubber, oil, chemicals, glass.

Business empire, or "one-man show"—both can profit from Beechcraft speed. For today America has two jobs: pouring forth armaments and keeping the civilian economy rolling. Discover what Beechcraft ownership can do for your business. Call your Beechcraft distributor. Or write Beech Aircraft Corporation, Wichita, Kansas, U.S.A.

*BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS*

# SUPERIOR COVERS THE *Field!*

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Yes, SUPERIOR goes all out to give you good supplies and fast service. No matter what your operation in the oil and gas industry, SUPERIOR offers you quality in supplies and equipment—nationally known brands you can depend on to do the job in drilling, production, processing or pipe lining.

More than that, SUPERIOR gives you *on-the-spot* service through well-stocked stores strategically located in the mid-continent oil area. When *you* need good supplies in a hurry, call your SUPERIOR Store!

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- Abilene, Texas
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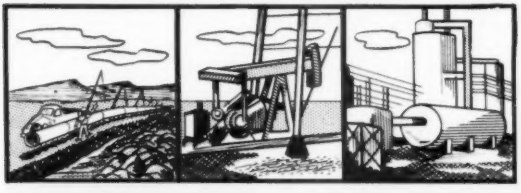



## SAVE TIME AND MONEY

SUPERIOR'S fabrication and machine shop in Shreveport, La., offers you general machine work; a pipe finishing plant equipped to upset, thread and couple oil country tubular goods and other types of pipes; and *complete* fabrication service. Write for SUPERIOR'S booklet, "Save Time and Money." Learn how the "Superior Method" of prefabrication can mean efficiency and profits on piping jobs of the oil, gas, chemical and power industries.

# SUPERIOR IRON WORKS & SUPPLY COMPANY, INC.

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# Your welders will seem like *Siamese Twins*

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DU PONT REG. U.S. PAT. OFF.

# PETROLEUM CHEMICALS DIVISION NEWS

DU PONT REG. U.S. PAT. OFF.

September ★ One of a Series of Interest to the Petroleum Industry ★ 1951

## New Houston Office for Gulf Coast District

The Gulf Coast District Office of the Du Pont Petroleum Chemicals Division will soon move into its new Houston headquarters. The new offices are located in the recently completed National Bank of Commerce Building. They are considerably larger than those formerly occupied by the Division's Houston staff and pleasant surroundings have been created by one of Houston's leading decorators.

## Superintendent of TEL Manufacturing Area

H. CLIFFORD BAILEY is superintendent of the Tetraethyl Lead Area of the Du Pont Chambers Works at Deepwater, N. J. He joined the Company in 1924 after graduating from M.I.T. and started his Du Pont career as a chemist in the Jackson Laboratory.

H. CLIFFORD BAILEY

In 1925 he was transferred to the Chambers Works. Here he held three jobs successively as a supervisor of the Phenylglycine operation, the Indigo Area and in the Tetraethyl Lead Area. In 1937 he was transferred to the Baton Rouge, La. plant as assistant manager.

After a period in military service he returned to Du Pont and was made technical assistant, Petroleum Chemicals Division, at the Wilmington office. In 1950 he was transferred to the Chambers Works to his present job of superintendent in charge of TEL manufacture.

# New Du Pont Color Movie Dramatically Depicts Safe Gasoline Transport by Tank Truck

### *Film Available to Petroleum Industry for Showings to Municipal Authorities, Safety Groups, Civic Organizations*

WHAT do Mr. and Mrs. America think of your gasoline trucks? Judging from reports in publications, and various restrictive regulations, they have some false notions about the safety of these vehicles. Since tank trucks are indispensable, something has to be done to change their minds. But what?

"IS THAT GASOLINE TRUCK SAFE?" asks a finicky lady motorist of our tank truck driver. In the new Du Pont movie, his clear explanation of the facts convinces her that the truck *is* safe.

To help the petroleum industry overcome this prejudice, Du Pont has produced a full-color sound movie on tank truck safety. This film is available to oil companies. It is a Hollywood-produced picture entitled "Pipeline on Wheels." The film is specially designed to give the public the facts about the safety features found in tank trucks built today.

Realistic acting and careful script writing point up the story. Forcefully and memorably the new film presents a winning case for the tank truck. Its message is in the form of an entertaining human-interest story. The chief characters, played by Hollywood actors, appear as typical, motoring-conscious Americans.

Throughout the picture, four main points are stressed: (1) The importance of the gasoline tank truck in our modern motorized civilization. (2) The fact that tank trucks are engineered and constructed for great strength and safety. (3) Evidence that tank trucks protect and retain their cargo even when rolled over or exposed to fire. (4) That size is no evil in tank trucks because large loads mean fewer trucks on the highway and, consequently, fewer exposures to traffic hazards.

Besides filling a definite need in public education, the film is ideal for training use. It can be employed effectively to develop job pride among tank truck drivers and maintenance men. Step by step, it shows how the modern tank truck is built to strict specifications for maximum safety. In two spectacular

**SPECIAL**

**In this issue . . .**

see back page for progress story on Du Pont's new TEL manufacturing facilities.

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

OVER

DU PONT

PETROLEUM CHEMICALS DIVISION
NEWS

DU PONT

CONTINUED

## New Movie

demonstrations with a full-size tank trailer loaded with actual gasoline, the movie proves conclusively that a gasoline truck can be rolled over without spilling and that it will not explode—even when subjected to severe fire beneath it.

In preparing the script, Du Pont consulted representatives of the Board of Fire Underwriters, the National Safety Council, the National Fire Protection Association, the API and NPA, as well as many automotive engineers and oil company personnel – over 100 people in all. These men cooperated enthusiastically and many offered sound suggestions which were incorporated in the film. As a result, "Pipeline on Wheels" is as authoritative as it is possible to make it.

THE SAFE CONSTRUCTION of a gasoline tank truck is stressed in this driver training scene from "Pipeline on Wheels."

Prints of the film are available to oil companies for use as they see fit and may be borrowed or purchased through any Du Pont Petroleum Chemicals Division District Office. The showing time is 26 minutes.

"Pipeline on Wheels" provides a feature attraction around which can be planned meetings with civic organizations, public officials, fire or police departments and other interested groups. And it provides a valuable supplement to training programs for tank truck drivers and oil industry personnel in general.

THIS "TAKE-HOME" BOOKLET, describing the movie in detail, is available to oil companies for distribution in connection with showings of "Pipeline on Wheels."

# New TEL Manufacturing Facilities Well Under Way at Du Pont

To help meet the growing demand for tetraethyl lead compounds, construction of Du Pont's new manufacturing plant is now well under way at Deepwater, N. J. These facilities, using a new, more efficient manufacturing process, are expected to be in production by January, 1952.

As a result, refiners can look forward to an additional supply of TEL to help them maintain their quality standards and to meet increased gasoline demands. Also, TEL will be more readily available whenever its need for military fuels is urgent.

Construction of the new facilities is being accomplished with a minimum of critical defense materials. The specially designed processing equipment, for example, requires a smaller amount of special steel alloys than the former type.

To keep construction moving at top speed, a crew of nearly 200 men is employed in building the new three-story plant. The building itself is on the Du Pont Chambers Works grounds near the present TEL manufacturing area. Du Pont also plans to maintain full production in the present facilities.

AS THE STEEL WORK of Du Pont's new TEL plant nears completion, the job foreman checks construction details.

## LITERATURE AVAILABLE

The Petroleum Chemicals Division of Du Pont has published a wide variety of material of interest to the petroleum industry. This includes technical papers, bulletins, reports and memoranda as well as equipment operation bulletins, safety regulations, tank cleaning data, marketing aids and the like.

Any of this is available on request to your nearest Du Pont Petroleum Chemicals Division District Office. A partial listing of available material is shown below:

Possible Mechanisms By Which Combustion Chamber Deposits Accumulate and Influence Knock
Serial A-2087a

Tank Talk—a 52-page booklet which outlines safe procedure for cleaning gasoline storage tanks. Written for the man who does the cleaning
Serial A-1134

Antiknock Antagonists—by H. K. Livingston, Jackson Laboratory
Du Pont Services to the Petroleum Industry
Serial A-663

### MOVIES AVAILABLE

Pipeline on Wheels—A 26-minute, full-color movie on tank truck safety. Suitable for both training and public relations purposes.

What Makes A Gasoline Good—An 18-minute cartoon movie in color. Presents the story of how high quality gasoline is made in easy-to-understand form. Ideal for dealer training meetings.

In addition to the above, Du Pont makes available a special library of films of particular interest to the petroleum industry.

DU PONT
Better Things for Better Living
. . . through Chemistry

# Petroleum Chemicals

E. I. DU PONT DE NEMOURS & COMPANY (INC.)
Petroleum Chemicals Division • Wilmington 98, Delaware

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IN CANADA: Canadian Industries Limited — Toronto, Ontario — Montreal, Quebec

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)



Printed in U. S. A.

# New slush pump moves up to 755 gallons per minute with help of TIMKEN® bearings

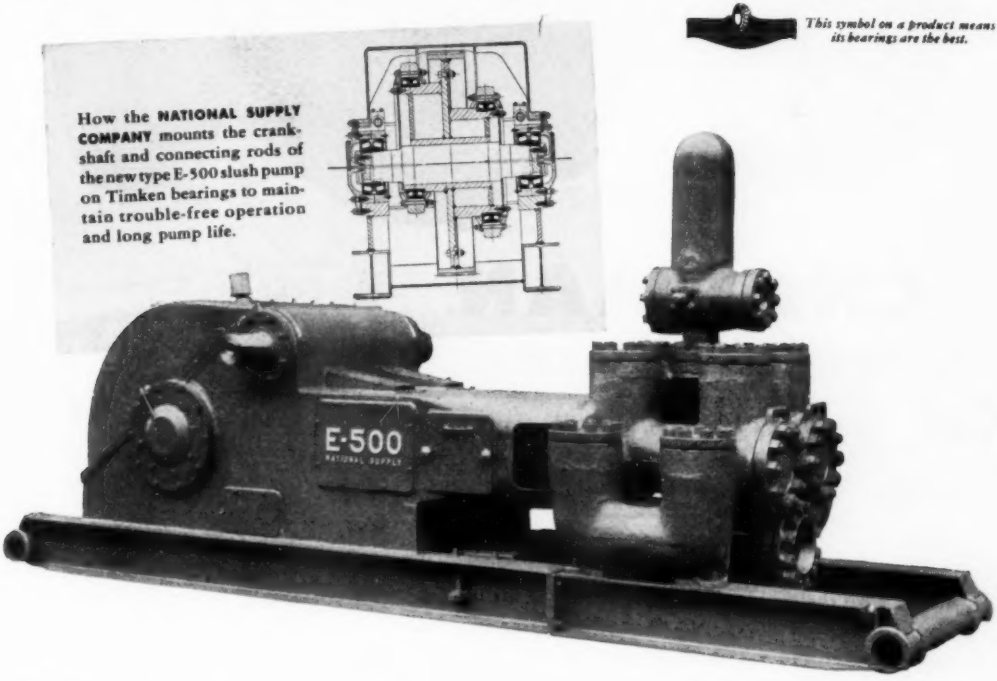
THE 755-gallon-per-minute capacity of this new Ideal type E-500 slush pump makes it one of the larger pumps used in the oil industry. Built by the National Supply Company, the pump's crankshaft and connecting rods are mounted on Timken® tapered roller bearings for long trouble-free service, minimum maintenance and lubrication.

Timken tapered roller bearings take any combination of radial and thrust loads, eliminating the necessity of using supplementary thrust devices. They hold crankshafts and rods in proper alignment. Due to line contact between rollers and races, they provide extra load capacity. Because of their true rolling motion and incredibly smooth surface finish, they virtually eliminate friction.

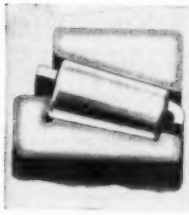
Timken bearings normally last the life of the machine for three reasons: (1) they're engineered for the job, (2) they're made of Timken fine alloy steel, and (3) they're precision manufactured.

Be sure to get all the advantages that only Timken bearings can give you by using them in the equipment you build or buy. Look for the trademark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

*This symbol on a product means its bearings are the best.*




How the **NATIONAL SUPPLY COMPANY** mounts the crankshaft and connecting rods of the new type E-500 slush pump on Timken bearings to maintain trouble-free operation and long pump life.



**GREATER LOAD AREA**

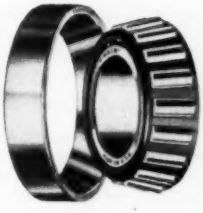
Because the load is carried on the *line* of contact between rollers and races, Timken bearings carry greater loads, hold shafts in line, wear longer.

The Timken Roller Bearing Company is the acknowledged leader in: 1. advanced design; 2. precision manufacturing; 3. rigid quality control; 4. special analysis steels.

**TIMKEN**

TRADE-MARK REG. U. S. PAT. OFF.

*TAPERED ROLLER BEARINGS*



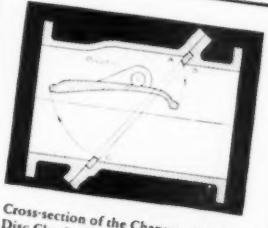
NOT JUST A BALL ○ NOT JUST A ROLLER ⊂⊃ THE TIMKEN TAPERED ROLLER ⊂⊃ BEARING TAKES RADIAL ⊂⊃ AND THRUST →⊂⊃← LOADS OR ANY COMBINATION →⊂⊃←

# CHAPMAN

## TILTING DISC CHECK VALVES

# Cut Maintenance Costs

## with Cushioned-Closing

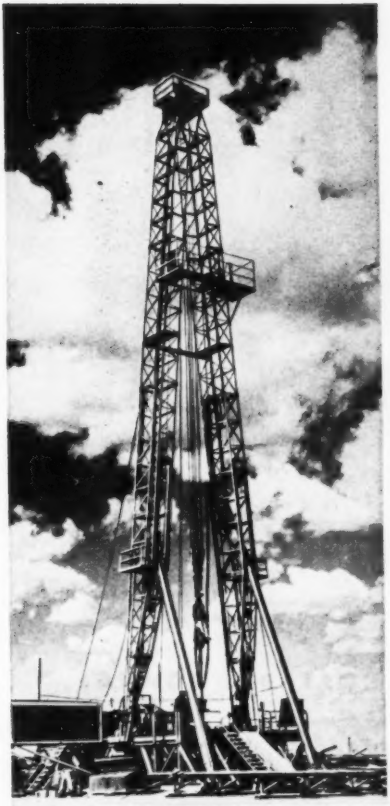


Cross-section of the Chapman Tilting Disc Check Valve illustrating the way that the balanced disc is supported on the pivot, with arrows showing the travel of the disc. A feature of the design is that the disc seat lifts away from the body seat when opening, and drops into contact when closing, with no sliding or wearing of the seats.

There's less wear on seating surfaces, hinge pins and bearings with the cushioned closing action in a Chapman Tilting Disc Check Valve. No destructive slamming. No fatiguing flutter. No vibration of pipe lines or adjacent structure — nor danger of opening pipe joints or rupturing pipe lines. Just a quick and quiet closure that cuts maintenance costs.

And what's more, the balanced streamlined discs in Chapman Tilting Disc Check Valves ride smoothly on the stream—reduce head losses 65 to 80% over conventional swing type checks. You'll want to know more about this maintenance-saving, more efficient check valve. Write today for engineering data, Bulletin #30.

**THE CHAPMAN VALVE MANUFACTURING COMPANY**
**INDIAN ORCHARD, MASSACHUSETTS**

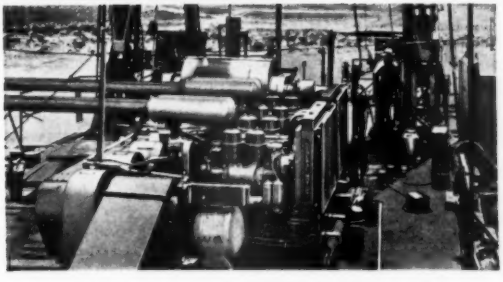


# Cuts 5 Days' Drilling Time

LAWLESS DRILLING CO. of Odessa, Texas, chopped five days off average drilling time in the Goldsmith field with this new GM Diesel-powered rig. The first well was completed in 31 days, the second in 28, and casing was set on the third in 26 days, including moving and rigging-up time. That compares with 32 to 35 days for completions in this field.

The GM Diesel engine-torque converter unit gets more work done faster because it eliminates unnecessary low-gear operation—automatically selects the correct speed for the horsepower requirements.

Designed as an integral part of Series 71 and 6-110 Diesel engines, the GM torque converter makes available more horsepower at the hook. It provides high starting torque and line pull with uninterrupted acceleration, simplified control and protection against shock-load damage to engine and rig.



All this—plus the well-known efficiency and compactness of GM 2-cycle Diesel engines—means faster round trips, easier, lower-cost moves and minimum engine and rig maintenance. For the full story, call your nearest GM Diesel distributor listed below or write us.

• • •

*This new Ideco Hydrair H-525 rig and mud pump, with Full View mast, is powered by two GM Diesel "Twin" Six Torque Converter Units. Another GM "Twin" drives a stand-by mud pump.*

ANSWER THE CALL — CIVIL DEFENSE

**DETROIT DIESEL ENGINE DIVISION**

SINGLE ENGINES... Up to 275 H.P. **DETROIT 28, MICHIGAN** MULTIPLE UNITS... Up to 825 H.P.

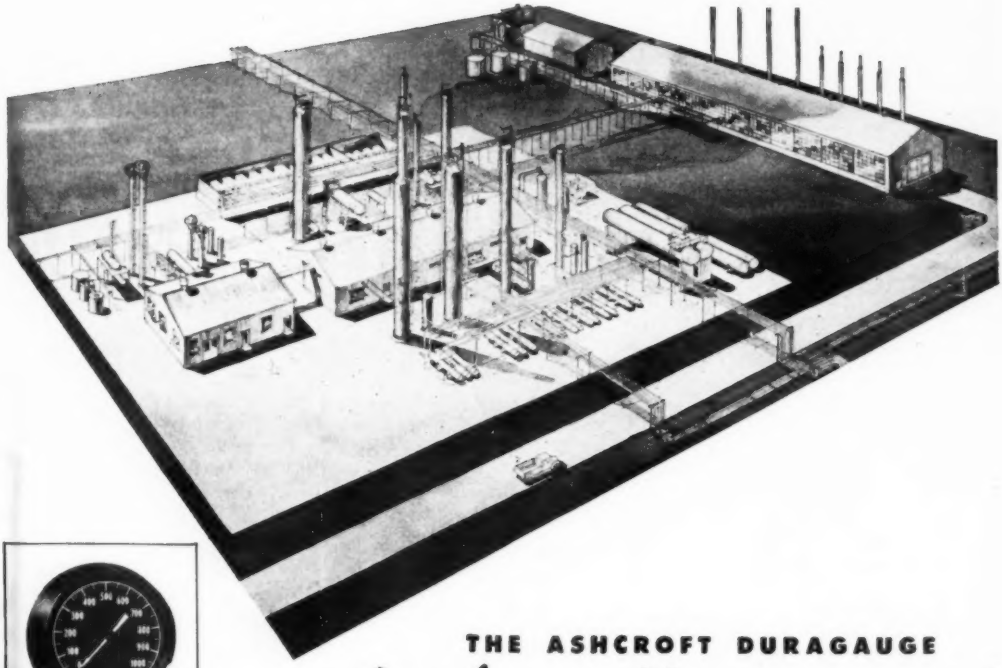
GENERAL MOTORS

GM — GENERAL MOTORS — DIESEL POWER

**DIESEL BRAWN WITHOUT THE BULK**

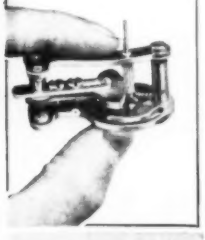
**GENERAL MOTORS CORP., DIESEL ENGINE SALES, PETROLEUM INDUSTRY, 1504 Philtower Bldg., TULSA 3, OKLAHOMA**

**CALIFORNIA:** Anderson-O'Brien Co., Los Angeles 21; Lawless Brothers, BAKERSFIELD; West Coast Engine & Equipt. Co., BERKELEY. **ILLINOIS:** Western Machinery & Engine Co., CENTRALIA. **KANSAS:** Diesel Equipment Co., Inc., WICHITA. **COLORADO:** Colorado Builders' Supply Co. (Equipt. Division), DENVER. **LOUISIANA:** George Engine Co., Inc., HARVEY; United Tool Company, SHREVEPORT. **MISSISSIPPI:** Taylor Machine Works, JACKSON. **MISSOURI:** Western Machinery & Engine Co., ST. LOUIS 10. **MONTANA:** Seitz Machinery Co., Inc., BILLINGS; Mountain Tractor Co., MISSOULA. **OKLAHOMA:** Diesel Power Co., OKLAHOMA CITY. **TEXAS:** Stewart & Stevenson Services, Inc., HOUSTON 1, McALLEN, DALLAS, CORPUS CHRISTI, WICHITA FALLS; Haynes Machinery Co., PLAINVIEW; Empire Machinery Co., Ltd., ODESSA. **WYOMING:** Colorado Builders' Supply Co. (Equipt. Division), CASPER.



**DURAGAUGE SPECIFIED!**

Ashcroft Duragauges are installed in The Pure Oil Company's Crude Stabilization and Gasoline-LPG Recovery Plant at Worland, Wyoming. Contractor: C. F. Braun & Co., Alhambra, California



## THE ASHCROFT DURAGAUGE

# ...tough, sensitive, accurate!

The Ashcroft Duragauge has a performance record second to none. Long life in "killing" services in refineries, chemical plants, and power stations prove it.

Ashcroft engineers made the Duragauge the standard of industry by discarding traditional theories about pressure gauge construction. They developed a movement with *nylon* pinion gear and bearings.

The Nylon Movement* is light, strong and dimensionally stable. Friction and wear are minimized, corrosion resistance is increased. Shock impact absorption is high. Maintenance is reduced. Overall advantages: greatly improved indicating sensitivity and sustained accuracy. The Duragauge, with Nylon Movement, outlasts all others.

The petroleum industry is faced with demands for increased defense and civilian production. The Duragauge can help assure uninterrupted operation. Get all the facts from your Ashcroft Distributor. Let him help you select the right Duragauge for *your* plant.

* Patented

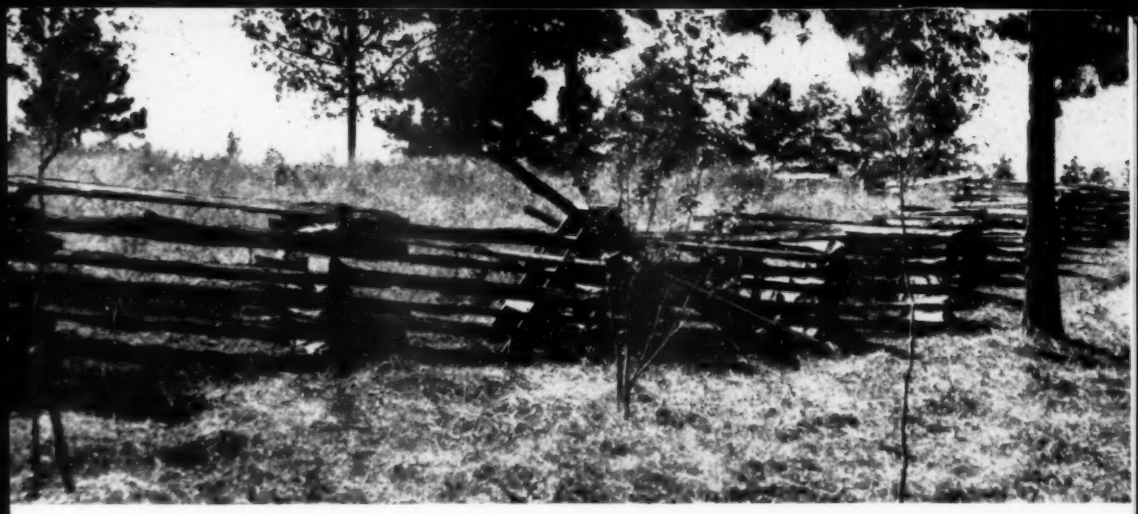
1850 ASHCROFT U.S.A.

# ASHCROFT GAUGES

MAXWELL MANNING MM

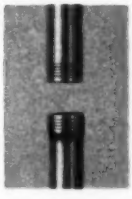
A product of **MANNING, MAXWELL & MOORE, INC.** STRATFORD, CONNECTICUT

MAKERS OF 'ASHCROFT' GAUGES, 'HANCOCK' VALVES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES, 'AMERICAN' ELECTRIC AND INDUSTRIAL INSTRUMENTS. BUILDERS OF 'SHAW-BOX' CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.



# PICTURESQUE...
# BUT IMPRACTICAL!

Along about the time the old rail fence was in its heyday, men were making pipe by boring holes through logs. Bored logs were used in Boston in the first public water-supply system in the United States. But today a man doesn't want wooden pipe. He wants steel pipe, preferably J&L Steel Pipe.



Wooden sucker rods will gather a crowd at any oil show. But men don't buy wooden sucker rods any more. They buy steel rods, preferably Axelson sucker rods.

And, shopping around from place to place to fill an order is becoming as obsolete as wooden pipe and wooden sucker rods. Our responsible ONE-STOP supply service is preferred by an ever increasing number of men in the oil and gas industry.

AMERICA NEEDS SCRAP TO MAKE MORE STEEL

"... here's MY warehouse!"

## Jones & Laughlin Supply Company

J&L STEEL

Subsidiary of Jones & Laughlin Steel Corporation

EXPORT: 405 Lexington Avenue, New York, N. Y., U.S.A.

General Offices: TULSA, OKLAHOMA

82 STORES • 17 OFFICES • 6 RESIDENT SALESMEN

# 15 Years...on the same job

## dependable, economical Electric Power

This central power unit on a Major Oil Company's lease in Glasscock County, Texas, has been operating successfully for 15 years on Dependable, Efficient Purchased Electric Power. This is another case history of the economy and performance you'll receive from Purchased Electric Power. Investigate today. Contact your nearest Power Company Engineer. He'll explain the advantages and savings you get when you switch to Low Cost Purchased Electric Power.

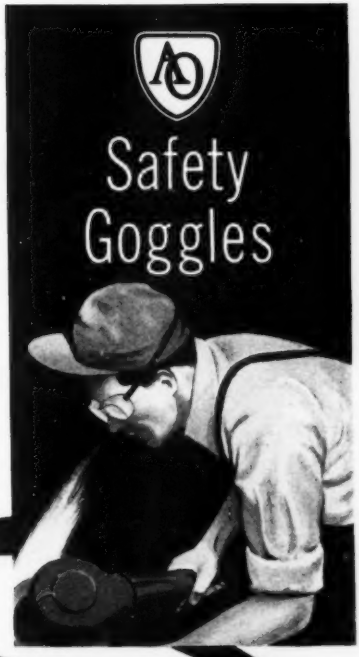
**Petroleum Electric Power Association**

ORGANIZED IN THE INTEREST OF GREATER SERVICE TO THE PETROLEUM INDUSTRY

CALL YOUR NEAREST ELECTRIC SERVICE COMPANY FOR MORE FACTS

OR ADDRESS YOUR REQUEST TO P. O. BOX 2771, DALLAS, TEXAS

# Both "PANORAMS" give BIG VALUE for Your EYE PROTECTION MONEY!



The model numbers and sizes differ (AO 600 for medium and larger faces—AO 800 for smaller faces) but you'll find the same superb wide angle vision, lightweight comfort and conformance to high safety and optical standards in both of these plastic goggles. Worn directly over the eyes or over personal glasses, they protect against flying particles from any direction. For chipping, grinding, babbitting, cutting rivets or rails, riveting, spike driving, spot welding. Your nearest AO Safety Products Representative can supply you.

**QUICK FACTS**

- Plastic frame and lenses. Cups conform closely to facial contours.
- Smooth face-contacting edges for maximum comfort.
- Many perforations of frame for ample ventilation and reduction of fogging possibility.
- Bridge is floating saddle type for comfortable fit without pressure.
- Lenses are shatter-resistant acetate. Note swivel rod in center for easy replacement. Clear or green. Green lenses absorb practically all ultraviolet radiations, reduce excessive glare.

American Optical Company
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

# De Laval Centrifugal Blowers

## go on-stream in

## first new design HOUDRIFLOW PLANT

*New Bulletin* NO. 0500 fully describes top-performance, maintenance-saving features of De Laval blowers plus data that make it virtually an engineering handbook on compression of gases and pipe friction. We have a new bulletin (No. 4215) on our high pressure mechanical drive turbines. Ask for a copy of it also.

**ANOTHER DE LAVAL FIRST** *

**LOCATION:** California Refining Company, Perth Amboy, N. J.

**PROCESS:** Houdriflow catalytic cracking.

**ENGINEERED BY:** C. F. Braun & Co.

**DE LAVAL EQUIPMENT:** Two 38,750 cfm single-stage, double-suction blowers, each driven by a De Laval "MCP" single-stage, high back pressure turbine. Operating conditions are 600 psi, 750F, 150 psi back pressure.

**FUNCTION:** Blowers discharge air at pressures to 5.3 psig for regeneration of the spent catalyst.

* De Laval "firsts" in blowers and compressors date as far back as 1902.

50th DE LAVAL Anniversary

DE LAVAL STEAM TURBINE CO., TRENTON 2, N. J.

TURBINES • HELICAL GEARS • CENTRIFUGAL BLOWERS AND COMPRESSORS
CENTRIFUGAL PUMPS • WORM GEAR SPEED REDUCERS • IMO OIL PUMPS

DL 100

# "What happens when Standard men go into the armed forces?"

**One question on many people's minds these days** *is how military service may affect themselves or people they know...their jobs, their family security. People ask us, of course, about what happens to employees of Standard Oil Company of California.*

**The answer shows what a big company can do.** Standard Oilers come through this trying period in better financial shape than you might expect:

**Let's take for example Bill,** an average young Standard Oiler. As a mechanic with the Company, he makes $368 a month. He has Company-paid life insurance worth $4,420, a pension plan paid partly by himself, other benefits.

**Now suppose Bill is called** into the armed forces. One of the tough problems he might face is a lower income for his family. But because he qualifies as to dependents and length of service, he'll be helped by a plan Standard has for him.

**When Bill leaves for active duty,** he's given an extra month's salary. Then Standard sends his family a monthly check to make up the difference between his military pay and his Company pay—an amount up to half his regular salary.

**Moreover,** Bill's Company life insurance remains in force—still paid for entirely by Standard. And the pension plan, which Bill paid for in part while he was working, continues to grow—but now Standard of California pays it all.

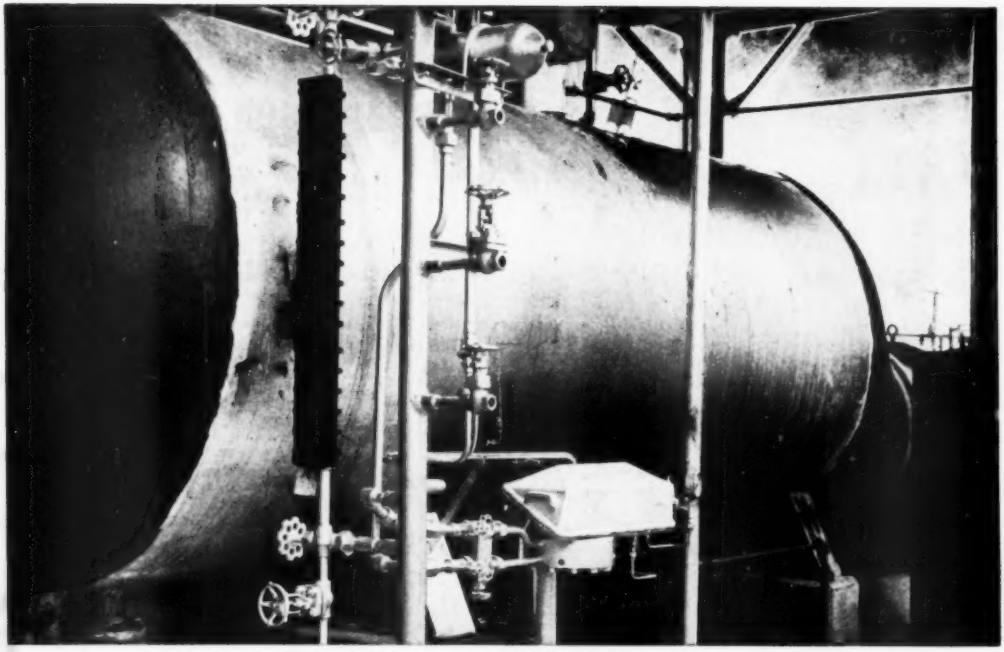
**When Bill comes back** from military service his job is waiting . . . his benefits intact. Standard, having big *economic* resources, can and does act to preserve the *human* resources of the nation . . . people like himself and his family.

**This is Standard's "G.I. Policy"** for qualified employees called into the Armed Forces. We believe it helps strengthen Company morale and that of the nation, too—another way Standard serves best by being a big company.

*I'd Like to Know . . .* Many people write to Standard asking pertinent questions about the Company. We answer all letters individually, but some points seem of general interest. We take this way of discussing them for every one. If you have a question, we urge you to write in care of: "I'd Like to Know," 225 Bush Street, San Francisco 20, California.

## STANDARD OIL COMPANY OF CALIFORNIA

**• plans ahead to serve you better**



Republic Transmitter measuring level in reboiler

# DIFFERENT . . . in design and performance

The Republic Pneumatic Transmitter is a device for converting process variables, such as flow, level, pressure or liquid density, into air pressures. These air pressures are a direct measure of the process variables or can be used as the measuring impulse for the actuation of an automatic controller.

The force-balance method of measurement, as employed by the Republic Pneumatic Transmitter, offers many inherent advantages such as:

**AMBIENT TEMPERATURE** — The effect of ambient temperature variations on the accuracy of a Republic Transmitter is negligible. Since all parts are equally affected by temperature changes, force and leverage relationships are not disturbed and accuracy is unimpaired.

**AIR SUPPLY PRESSURE**—The effects of changes in air supply pressure is so small that it is guaranteed negligible.

**LINE PRESSURE** — The effect of variations in line pressure has been completely eliminated.

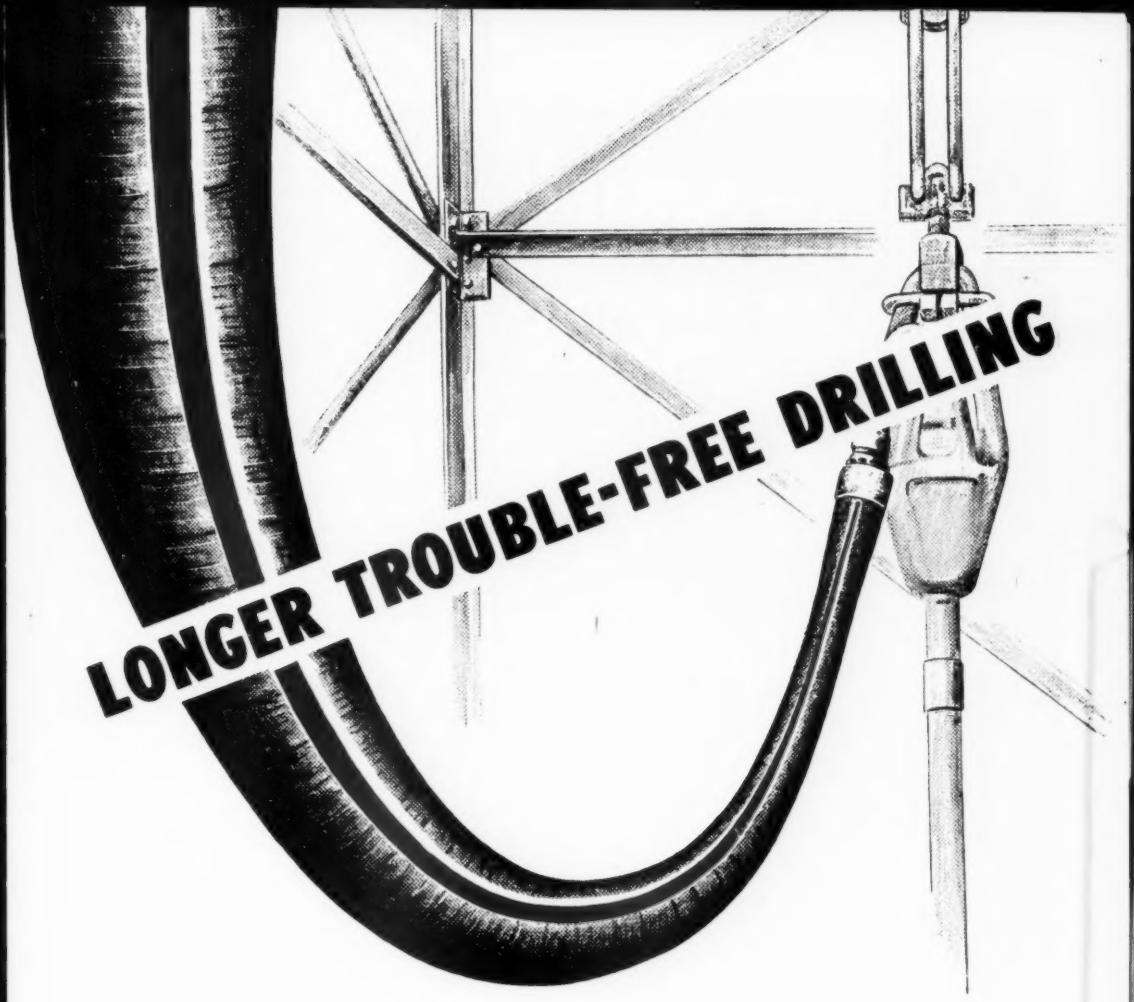
**SENSITIVITY**—Due to the negligible motions required for complete operation of all parts for full scale changes, no appreciable hysteresis results from reversal of direction of measurement change. The hysteresis loop is so small that it is undetectable by ordinary means, being less than 1/20 of 1%.

**ACCURACY** — The accuracy of the Republic force-balance method of measurement is higher than can be consistently secured and maintained with any other method. Transmitting pressure vs. measured force is guaranteed within ½ of 1% of meter range.

In addition to these five important features, the Republic Pneumatic Transmitter is extremely flexible in application, easy to service and of rugged construction.

If you have a flow, level, pressure or liquid density metering or control problem may we suggest that you investigate the Republic Pneumatic Transmitter? Data Book No. 1002, which contains complete details of this instrument, will be mailed to you upon request. Write for it today!

**REPUBLIC FLOW METERS CO.**
**2240 Diversey Parkway, Chicago 47, Illinois**




# RAY-MAN ROTARY HOSE

". . . Drills more hole than any rotary hose I've seen!" • This is typical of the good word for Ray-Man Rotary Hose that's going around among tool pushers. It's no coincidence that Ray-Man lasts so long. Ray-Man is far more flexible . . . easier to transport and make up without accident. It's a self-relaxing hose that hangs steady in the rig under high pumping pressure. • Couplings are built-in, streamlined, and blow-out proof. All this adds up to less strain—less wear—more drilling per hose.

*Hose, V-belts, transmission belting, packing, engineered for all phases of the oil industry, are described in Catalog 6903. A copy will be mailed to you on request.*

**DISTRIBUTED BY NATIONAL SUPPLY COMPANY IN ALL PRINCIPAL OIL FIELDS**

RM

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

## RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose • Fan Belts • Brake Linings • Brake Blocks • Clutch Facings • Packings • Asbestos Textiles • Powdered Metal Products • Abrasive and Diamond Wheels • Bowling Balls

# CORROSION CRIPPLES-
# MORE WAYS THAN ONE

## Valuable products as well as vital equipment are threatened

Corrosion takes its toll in more ways than one—it eats away costly, hard-to-get equipment—wastes man-hours while plants are shut down for repairs—and causes loss of vitally-needed products through contamination.

Every industry suffers from corrosion in some form, yet much of this waste can be avoided by taking these steps:

1. Check manufacturing equipment, storage tanks, and other items exposed to corrosive fumes, acids, alkalies, or moisture.
2. Arrange to protect them with AMERCOAT — the corrosion resistant coatings, each built to conquer specific industrial corrosion problems.

Manufacturers in nearly every industry have found that it pays to protect — protect with AMERCOAT.

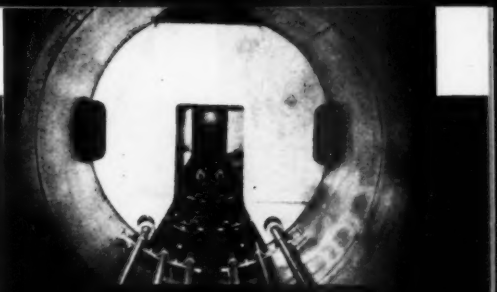
**AMERCOAT CORPORATION**

A division of American Pipe and Construction Co.

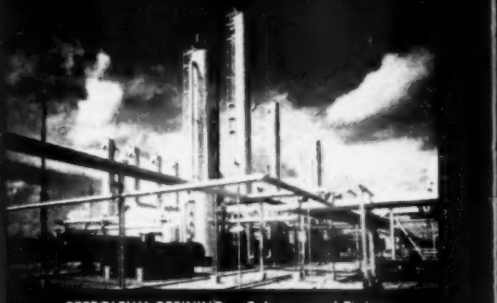
5600 FIRESTONE BLVD., SOUTH GATE, CALIFORNIA

FOLLOW THE LINE OF *most* RESISTANCE

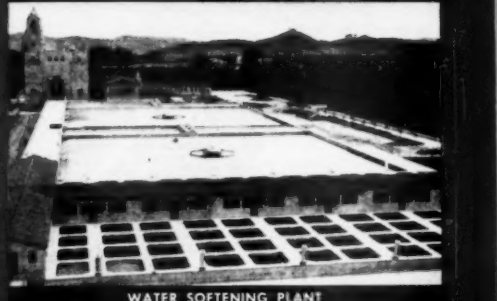
2-51-I



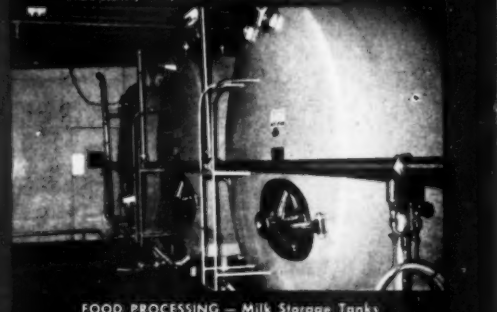
CHEMICAL PLANTS — Caustic Soda Tank



PETROLEUM REFINING — Columns and Piping



WATER SOFTENING PLANT
Photo Courtesy Metropolitan Water District of Southern California



FOOD PROCESSING — Milk Storage Tanks

TEXTILE MILLS — Dyeing and Finishing

**Wagner**
**ELECTRIC MOTORS**
**...the choice of leaders in industry**

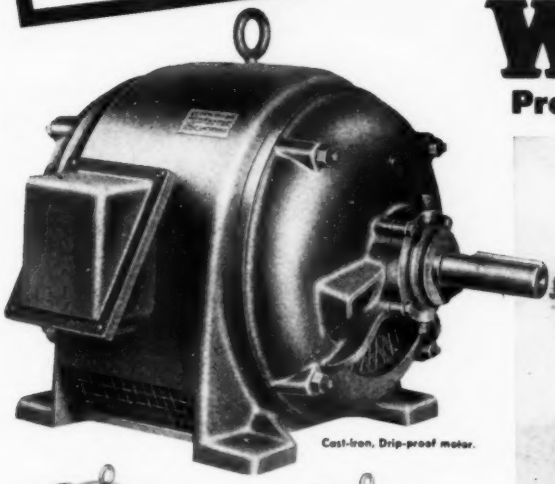
*for dependable operation of*

**OIL WELL PUMPING UNITS**

**CHOOSE**

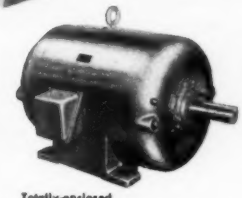
# Wagner

**Protected Type Motors**



Cast-iron, Drip-proof motor.

Cast-iron, Splash-proof motor.



Totally-enclosed fan-cooled motor.

Oil well pumping rigs need motors with plenty of stamina. They must operate without attention, day in and day out, in driving rain—or sand and dust storms—under a blazing sun—and in freezing weather. Sturdy, dependable Wagner Motors have shown such stamina in thousands of tough jobs . . . That's why you'll find so many Wagner Motors on the job in the oil fields.

Wagner polyphase motors for oil well pumping are built in two electrical types: High torque, normal slip; and High torque, high slip. The line includes drip-proof motors that are economical to use and splash-proof motors, protected against heavy driving rains. For applications requiring single-phase motors, Wagner can furnish capacitor-type motors with the same enclosures. The line also includes totally-enclosed motors for use in pumping stations and refineries.

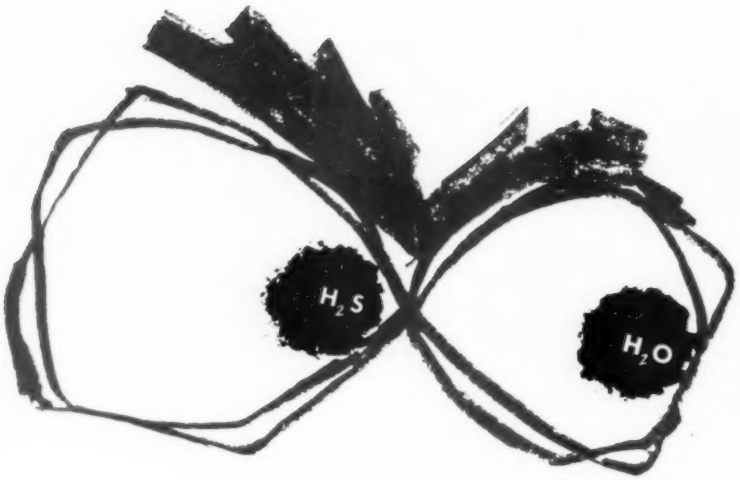
Write for Bulletin MU-137 on Oil Well Pumping Motors and Bulletin MU-132 on Totally-Enclosed Cast Iron Motors. Thirty-one Branch offices are ready to assist you in any motor application problem.

**® Wagner Electric Corporation**
1891 WE 1951

**WAGNER ELECTRIC CORPORATION**
**6389 Plymouth Ave., St. Louis 14, Mo., U.S.A.**

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

**BRANCHES IN 31 PRINCIPAL CITIES**



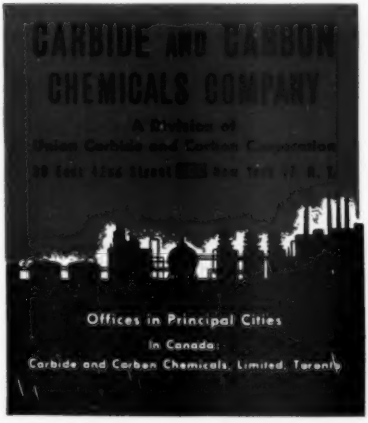

# $H_2S$ and $H_2O$ need not cause you any Woe...

| When you use | To remove |
|---|---|
| MONOETHANOLAMINE or DIETHANOLAMINE | $H_2S$ |
| DIETHYLENE GLYCOL or TRIETHYLENE GLYCOL | $H_2O$ |

More corrosive hydrogen sulfide is being removed from hydrocarbon gases with monoethanolamine and diethanolamine than by any other method. Some companies are even realizing a profit from this impurity by converting it to elemental sulfur or selling it as concentrated $H_2S$.

And water can readily be removed from high pressure transmission lines with diethylene glycol and triethylene glycol. Thus you maintain capacity and avoid pipe line and regulator clogging.

Twenty years ago the introduction of monoethanolamine, diethanolamine, diethylene glycol, and triethylene glycol by Carbide and Carbon Chemicals made possible efficient and economical methods of removing $H_2S$ and water from hydrocarbon gases. During this period we have compiled considerable data on the properties and use of these helpful chemicals. If you are constructing new facilities, or are replacing, enlarging, or modernizing your present equipment, we believe these data will save you time and money.


CARBIDE AND CARBON CHEMICALS COMPANY
A Division of
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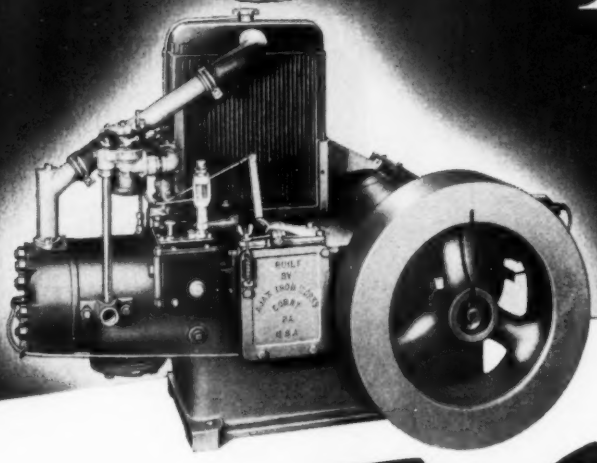
NEW BABY at Ajax



THE Ajax 5" x 6½" GAS ENGINE

**LONG LIFE** **LOW MAINTENANCE**

*plus every advantage of large, medium speed types*

**Meet the Little Giant among gas engines—built like a big one, bulging with muscle, yet has but a tiny appetite for fuel! This is *the* engine for "start it and forget it" pumping service, where the big boys are not required. ● See the new AJAX 5" x 6½" at your nearest supply store!**

AJAX ENGINES

## AJAX IRON WORKS

*Manufacturers of Gas Engines • Steam Drilling Engines • Industrial Steam Engines*

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better measurement and control of

# LIQUID LEVEL

In the measurement or control of liquid level — whether your problem involves turbulent, viscous or corrosive liquids, open tanks or closed pressure vessels — Foxboro offers complete diversity of premium-quality instruments to meet the requirements . . . and unmatched application experience to guide specification or design of the most efficient system for your operation.

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**For over 40 years, specialists in the measurement and control of temperature, pressure, flow, liquid level, humidity . . .**

THE FOXBORO COMPANY • FOXBORO, MASSACHUSETTS, U.S.A.

● *672,000 new net tons of steel per year*—that's the goal of Republic's latest $75,000,000 expansion program in the Cleveland district.

But, making steel *takes* steel . . . many, many tons. For example, Republic must "plant" more than 1,194,000 feet of 10¾" Electric Weld pipe. This pipe will serve as piling driven 110 feet into the earth to support four new 275-ton open hearth furnaces. More steel must be diverted to the construction of a new blast furnace, coke ovens, a reducing mill and soaking pits.

This program is a major part of Republic's share in expanding the nation's annual steel production potential to 117,500,000 tons by late 1952. First steel from these facilities is scheduled to be poured early next year. This means more steel for defense, and for all products of American industry.

**REPUBLIC STEEL CORPORATION**
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N.Y.

REPUBLIC *Electric Weld*
NORMALIZED CASING AND TUBING

REPUBLIC STEEL

**Other Republic Products include Line Pipe—Carbon, Alloy and Stainless Steels—Upson Studs, Bolts and Nuts—Electrunite Heat Exchanger Tubes**

FROM original idea to performance-guaranteed installation, each Chemico process is carefully tested and developed in these well-equipped laboratories and pilot plant.

On new processes, pilot plant or semi-commercial scale operations are conducted until they are fully proven. As a result, "growing pains" are radically reduced, proper construction materials can be selected and equipment sizes calculated for large scale commercial operation.

By means of these step-by-step, developmental methods, Chemico has given industry the drum-type, flash film and high temperature acid concentrators, the hot coke sludge conversion process, a new sulfur recovery process, economical plants for recovering alkylation spent acid and pickle liquor, and many other well-known and widely accepted processes.

Today, Chemico laboratory technicians and pilot plant operators in Linden, N. J. are busy proving out ideas that promise much for the future.

**Extensive use of laboratory and pilot plant research is another important reason why Chemico plants are profitable investments.**

**CHEMICAL CONSTRUCTION CORPORATION**

A UNIT OF AMERICAN CYANAMID COMPANY

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*Chemico Plants are Profitable Investments*

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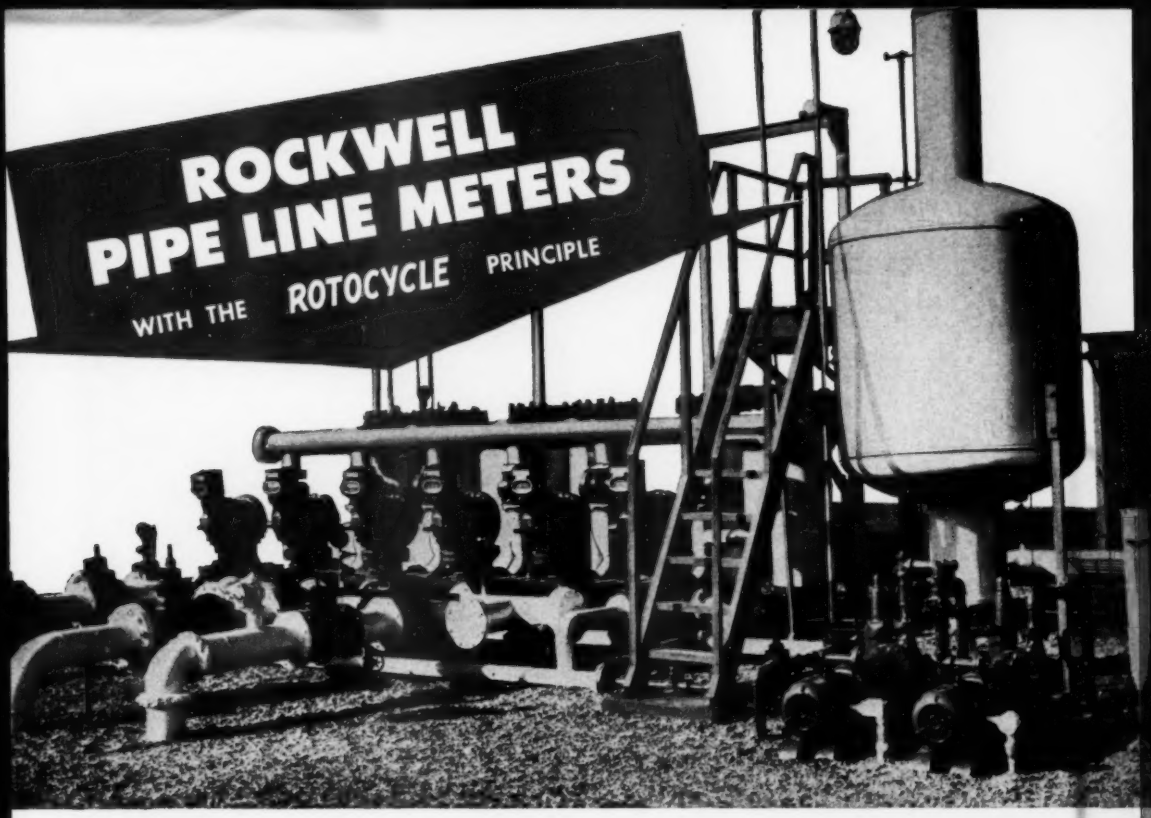
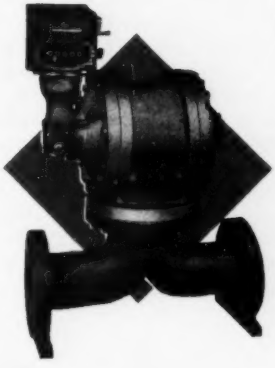



# PAY OFF *where you take off!*

When you guard your take-offs with Rockwell Rotocycle meters you protect your pay-off points in two ways. First you gain the mechanical advantages of a proved meter design that has rolled up impressive durability records on the nation's leading pipe lines. Second you are assured of precision accuracy that accounts for every drop of throughput and every penny of return.

Rockwell Rotocycle meters are made in five sizes for either high or low pressure service and may be optionally fitted with temperature compensators, straight reading or printing registers. Write for bulletins and case histories of actual operator's experience.



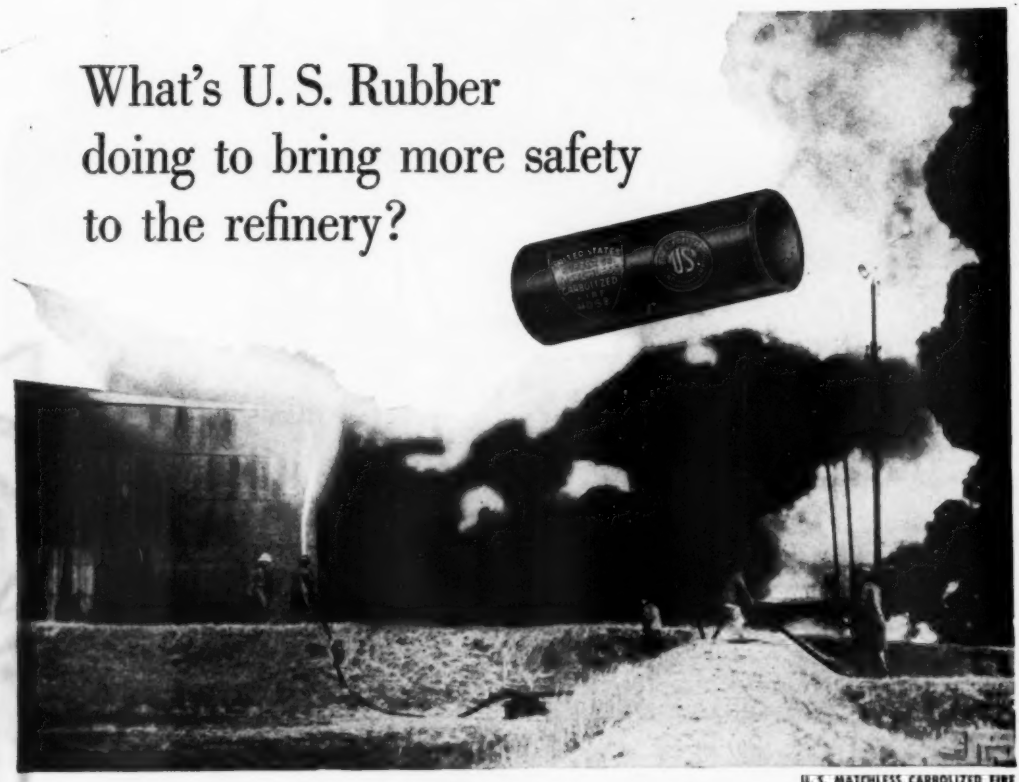
Model 6 PL Rockwell Rotocycle with printing register. Capacity 1150 barrels per hour.

**Rockwell** MANUFACTURING COMPANY

PITTSBURGH 8, PA.

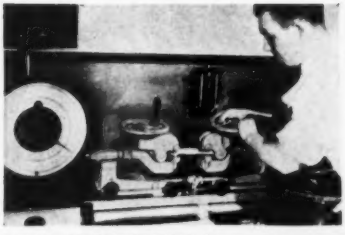
Atlanta Boston Chicago Columbus Houston Kansas City
Los Angeles New York Pittsburgh San Francisco Seattle Tulsa

# What's U. S. Rubber doing to bring more safety to the refinery?



**U. S. MATCHLESS CARBOLIZED FIRE HOSE** has new flexibility, lightness and pressure resistance, while retaining its desirable "soft" characteristics. The tube is of the best extruded rubber, assuring an extremely smooth waterway. Every length tested to 400 pounds pressure before shipment. Black or white cover and capped ends of high-grade neoprene to combat acid, fumes and burning sun rays.

"U. S." standards in safety and durability usually exceed those of safety boards and protective statutes. That's why "U. S." has won a preferred place in modern, well-protected refineries. United States Rubber Company engineers are constantly developing new applications for hose, making hose do things it has never done before. Over one hundred years of experience and great stocks of research data enable them to solve almost any hose problem presented. Tell them about your hose problems. For further information write to address below:



**TENSILE TESTING MACHINE** in United States Rubber Company laboratory. Samples from every roll of carcass material used in steam hose are tested for strength, stretch and other performance qualities. On a special outdoor rack, constantly flexed hose is tested by passing high pressure steam through it for thousands of hours.

**U. S. MATCHLESS STEAM HOSE** is burst-proof. When, after long service, the rubber finally fails to resist the action of the steam, the steam *leaks* through the wall structure, indicating a replacement should be made. It is excellent for steam supply lines from docks to oil barges and for fire protection in refineries.

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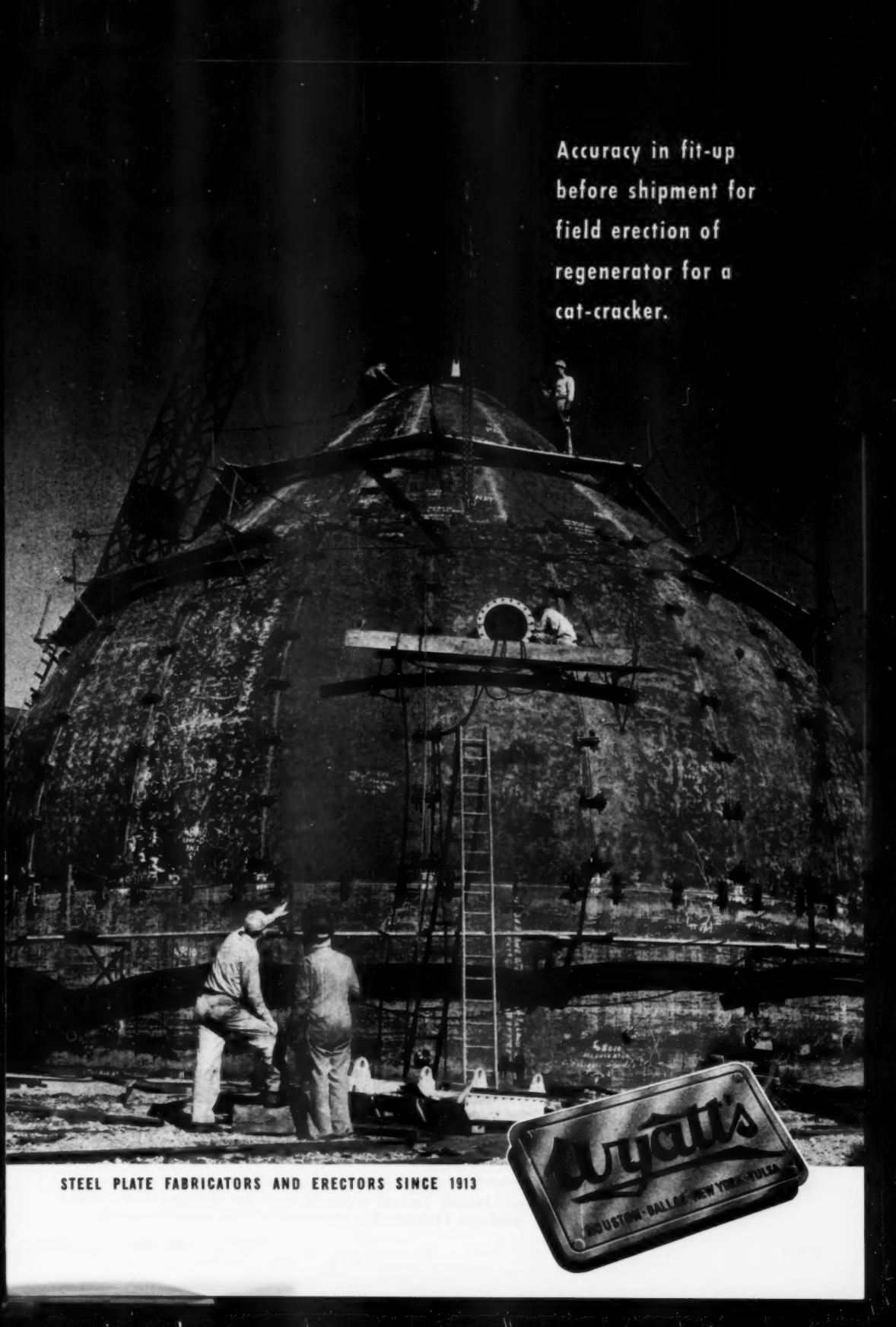



STEEL PLATE FABRICATORS AND ERECTORS SINCE 1913

# FISHER® SAFETY SHUT-OFF VALVES

## TYPES 10K & 10L

1
2
3
4
5
6
7
8
This one is about the same except that, if the pressure connected here gets too high, the flow of gas will be shut off
10
9
Both available in sizes 1" to 2" screwed end, or 1" to 6" flanged end. Furnished with either quick opening metal to metal or composition disc inner valve
Both types can be furnished for pressure on diaphragm up to 100 pounds

### 10K

For installation in gas distribution systems where a loss of gas pressure might extinguish flames of various gas burners. Type 10K will positively protect such installations from any explosion hazards should gas pressure be re-established before pilots have been relighted, because the regulator will go closed and stay closed until manually reset and leverage knock-out device properly connected.

### 10L

For installation in gas distribution systems, to protect meters, burners, and other instruments from excessive pressure which might be caused by failure of a high pressure regulator or similar condition. Type 10L regulator remains in open position as long as normal pressure is on diaphragm, but should excessive pressure occur in the gas system, diaphragm will be forced to its lower position, causing leverage knock-out device to disconnect, allowing weighted lever to close inner valve. Must be manually reset after emergency pressure condition has been corrected.

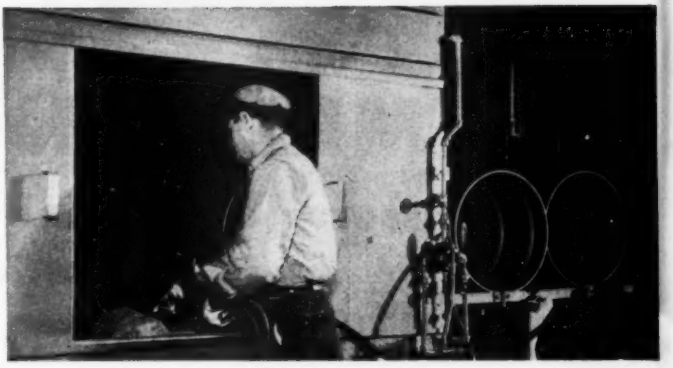
**FISHER GOVERNOR COMPANY**
**Marshalltown, Iowa**

FISHER

WORLD LEADER IN THE MANUFACTURE OF PRESSURE REGULATORS AND IN RESEARCH FOR BETTER PRESSURE CONTROL

# protects containers . . .

. . . protects contents



Spraying lining material on drums. Data on Gaco Drum Lining courtesy Gates Engineering Company, P. O. Box 1711, Wilmington, Del.

SUCCESS where other coatings fail! That's the story on drum linings based on VINYLITE Brand Resins!

Keys to this success are the inherent flexibility and the lasting adhesion of these highly chemical-resistant resins which protect containers from contents as well as contents from containers. Simple cleaning puts the containers back in service over and over again.

It explains why coatings based on VINYLITE Brand Resins are so widely used in the petroleum, chemical and processing industries on tanks, pipes, valves, structures, equipment. Preserving metal and slashing maintenance costs, they remain unaffected for years by oils, greases, water, salt, corrosive atmospheres, alkalies, most strong acids and other chemicals.

They withstand impacts that dent and deform metal surfaces. They do not chip, peel, or flake. Odorless, tasteless, non-flammable, they come in many colors and are strongly resistant to sunlight, mildew, fungi, and aging.

Let us send you "The Story of Surface Coatings" and a list of representative suppliers of metal, concrete and masonry coatings based on VINYLITE Brand Resins. Write Dept. LB-68.

Vinylite BRAND RESINS

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*A Division of*
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# THE MISSION "TEAM"

## assures *efficient* slush pump operation

Mission Silver Top Valve for Normal Pressures

In slush pump operation, the Piston, Rod, Liner, and Packing are the "backfield team" that deliver the real power. It is essential that these parts be in perfect alignment, have perfect fit, and work together with perfect mechanical precision!

We have produced the new perfected MISSION "Super Service" Liner . . . accurately bored, induction hardened to uniform case thickness, precision honed, and "Satin Finished" . . . to enable you to obtain the same quality in liners that you obtain in MISSION Pistons, Rods, and Packing.

These products, plus MISSION Slush Pump Valves, constitute a perfectly-mated "MISSION Team" of expendable Slush Pump Parts, ***unbeatable*** for economical slush pump service! Available through all supply stores . . . Mission Manufacturing Co., Houston, Texas. Export: 30 Rockefeller Plaza, New York. European Address: London, England.

Mission Super-Service Valve for High Pressures

"ROLLING DOG" SLIPS
TUBING SWABS
PLUG VALVES
CENTRIFUGAL PUMPS

Silver Anniversary MISSION MANUFACTURING CO. 1951

MISSION MANUFACTURING CO.

# They Say—

### "Importance of Williston"

Sir:

Your August 23 editorial on "Importance of Williston" is excellent—the sort of thing that needs saying—except for a phrase and a sentence, both in the same paragraph.

The phrase "where older concepts of petroleum geology considered it most unlikely" is misleading unless by "older" you mean older than I think you do. As far back as 1920 some of us, at least, recognized that the Williston basin had oil possibilities, if only we knew how to find and produce them. Standard of California recognized the possibilities in the 20's and 30's and took a chance on finding them by drilling a well; I don't remember the date when they drilled it.

The 1941 A.A.P.G. symposium on "Possible Future Oil Provinces" included the Williston basin, as did the similar symposium of 1951. Our "concepts of geology" did not consider the basin unlikely; the economics of the time made it unlikely that the oil could be found and produced at a profit.

The sentence, "Williston is so big, so covered with glacial deposits, and has so few definite structures that it was generally unattractive" likewise is a bit off the beam. The bigness of the basin has never been a deterrent; and "has so few definite structures" should have read "its structures were so hard to find and define."

You had the right point when you said, "Commercial possibilities have now caught up with geological probabilities." That's the whole story, and the wording I have quoted contradicts it.

The rest of the editorial is excellent, particularly its closing sentence, to which the rest is preamble: "So long as the industry has the economic incentives to continue this process, the nation need not worry much about running out of oil."

Max W. Ball, Consultant,
Washington, D. C.

*Editor's note: Some prominent geologists are on record, and not so long ago, as belittling the likelihood of finding much oil in Williston, and for reasons about as summarized in the editorial. However, the intent of the phrases criticized was that a decade ago commercial production in Williston was considered unlikely, or that Williston was not then very attractive to wildcatters. The main point of the editorial was, as Mr. Ball says, that "possible" future oil provinces are becoming "probable" or "actual" as the result of economics, exploration technology, and new geological knowledge.*

### Ready to Serve

"Men and women of the oil industry are ready to serve America to the best of their ability whatever happens, and are better equipped to meet any emergency than ever before. The oil industry met all essential civilian needs in the last war and today is producing and marketing about 25 per cent more oil and oil products than at the peak of World War II. We are ready to deliver about 5 gal. for every 4 gal. we could deliver 5 years ago.

"Since the end of World War II, oil companies have found more oil in the ground—our proved reserves are at an all-time high—refining facilities have been enlarged and improved; oil-transportation facilities have been increased; we have more and better pipe lines, larger and faster tankers, better barges, new railroad tank cars and tank trucks. The industry's ability to move and distribute has been increased more than 25 per cent all along the line from oil well to bulk plant.

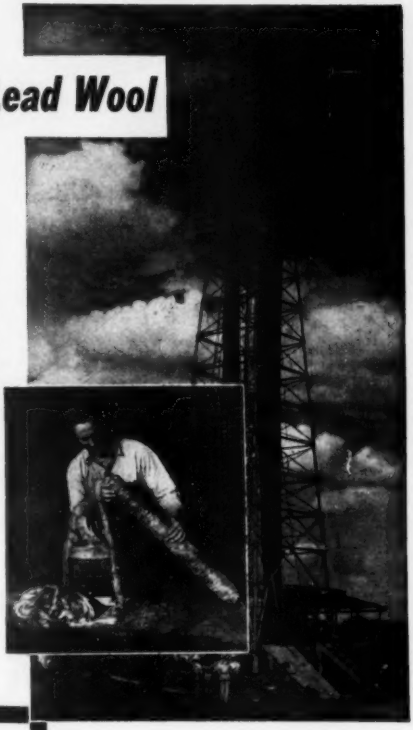
"To keep pace with demand, the industry must have tremendous quantities of steel, other raw materials, and new capital so it can enlarge its well-drilling activities and its refinery and transportation programs. Oil men are cooperating voluntarily and whole-


**Eagle-Picher Lead Wool**

**STOPS**

***bottom water***

Rule out the risk of oil-wasting bottom water shutdown by tamping Eagle-Picher Lead Wool in the hole. The finely stranded, flexible metallic wool makes a water-tight plug that seals every crack and crevice. Comes in convenient 50-pound sacks—easy to place in special cartridge-shaped Eagle-Picher Wire Containers sized to fit all casings. Order through your jobber.



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heartedly with government agencies in efforts to find the best ways of meeting this challenge."

*—Paul I. Adcock, division manager, Mid-Continent Petroleum Corp., in a speech before the Oil Industry Information Committee at Waterloo, Iowa.*

### "Look Here, Young Man"

Sir:

Your editorial "Look Here, Young Man" (September 13) is a masterpiece.

This is the type of piece that ought to be reprinted and sent to every newspaper publisher in the state, as "from one Oklahoma publishing company to another."

This particular editorial will have universal appeal and would doubtless evoke much editorial comment favorable to the industry.

L. D. Melton,
Oklahoma City, Okla.

## CALENDAR

**October**

**American Institute of Mining and Metallurgical Engineers, petroleum branch, fall meeting, Oklahoma City, October 3-5.**

**California Natural Gasoline Association, twenty-sixth annual fall meeting, Ambassador Hotel, Los Angeles, October 4-5.**

**Texas Mid-Continent Oil and Gas Association, annual meeting, Hotel Beaumont, Beaumont, Tex., October 8-9.**

**American Oil Chemists' Society, fall meeting, Edgewater Beach Hotel, Chicago, October 8-10.**

**National Safety Council, thirty-ninth national safety congress and exposition, Stevens Hotel, Chicago, October 8-12.**

**Indiana Independent Petroleum Association, fall convention, Hotel Severin, Indianapolis, October 13-14.**

**Oil Progress Week, October 14-20.**

**National Association of Corrosion Engineers, Permian Basin Corrosion Tour, Odessa, Tex., October 15-16.**

**American Petroleum Credit Association, twenty-seventh annual conference, Adolphus Hotel, Dallas, October 15-17.**

**American Gas Association, annual convention, Kiel Auditorium, St. Louis, October 15-17.**

**National Metal Congress and Exposition, American Society for Metals, American Welding Society, American Institute of Mining and Metallurgical Engineers, and Society for Non-Destructive Testing, Hotels Statler, Book-Cadillac, and Detroit-Leland, Detroit, October 15-19.**

**Institute of Gas Technology, annual meeting, Chicago, October 18.**

**American Chemical Society and Southern Association of Science and Industry, Southwide Chemical Conference, Wilson Dam, Ala., October 18-20.**

**National Association of Corrosion Engineers, South Central Region, annual meeting, Corpus Christi, Tex., October 18-20.**

**American Association of Petroleum Geologists, regional meeting, Commodore Perry Hotel, Austin, Tex., October 18-20.**

**Natural Gasoline Association of America, southern regional meeting, Blackstone Hotel, Tyler, Tex., October 19.**

**American Institute of Chemical Engineers, sixth annual South Texas Section technical meeting, Hotel Galvez, Galveston, October 19.**

**Independent Petroleum Association of America, Shamrock Hotel, Houston, October 21-23.**

**American Institute of Electrical Engineers fall general meeting, Hotel Cleveland Cleveland, October 22-26.**

**Fifteenth Penn State Technical Conference on Petroleum Production meeting at State College, Pa., October 24-26.**

**Society of Exploration Geophysicists, eastern regional meeting, Webster Hall Hotel, Pittsburgh, October 25.**

**American Institute of Mining and Metallurgical Engineers, petroleum branch, annual meeting of West Coast chapter, Elks Club, Los Angeles, October 25-26.**

**Society of Automotive Engineers, diesel-engine division, Drake Hotel, Chicago, October 29-30.**

**American Institute of Mining and Metallurgical Engineers, fall meeting of all branches in connection with Mexican Bureau of Mines, Hotel Del Prado, Mexico City, October 29-November 3.**

**Society of Automotive Engineers, fuels and lubricants division, Drake Hotel, Chicago, October 31-November 1.**

**November**

**Louisiana-Arkansas Division, Mid-Continent Oil and Gas Association, twenty-ninth annual meeting, Roosevelt Hotel, New Orleans, November 1-2.**

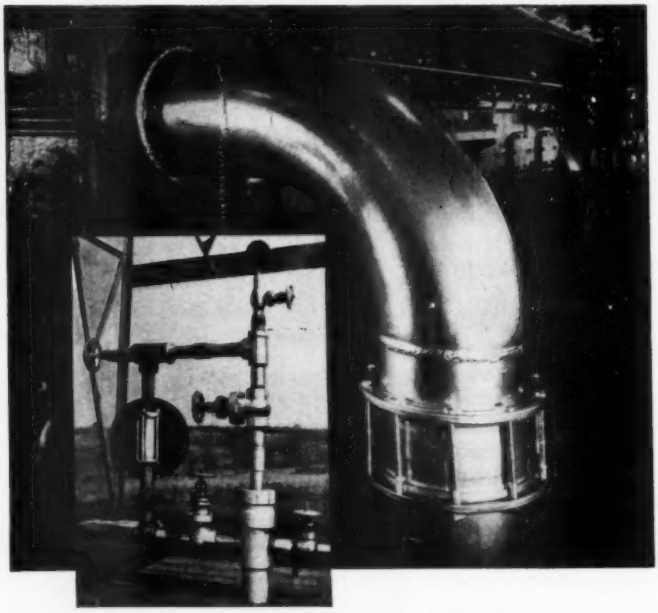
**American Association of Petroleum Geologists, Pacific section annual fall meeting, Ambassador Hotel, Los Angeles, November 1-2.**

**American Petroleum Institute, thirty-first annual meeting, Stevens Hotel and Palmer House, Chicago, November 5-8.**

**Southwest Research Institute, second conference on coastal engineering, Rice Hotel, Houston, November 7-10.**

**Gulf Coast Association of Geological Societies, first annual meeting, Roosevelt Hotel, New Orleans, November 15-17.**

**Rocky Mountain Oil and Gas Association.**

**On equipment . . . or in the field . . .**

# DRESSERS *STAY TIGHT*

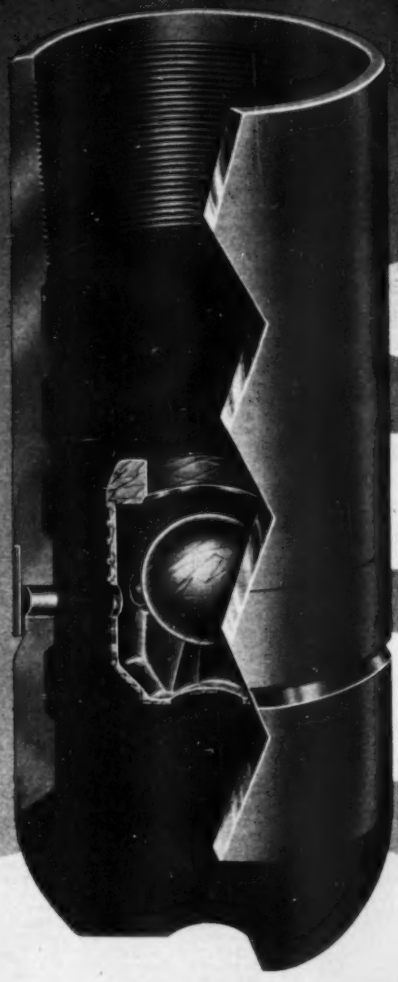
Wherever you have pipe to join, use Dresser Couplings and Long Sleeves. They make quick, dependable connections, even where pipe ends don't quite meet. Dressers are simple to join and give you a "Flexible-Tight" connection every time.

Get Dressers from your nearest oil field supply store, or at our Houston warehouse.

**DRESSER** "FLEXIBLE-TIGHT" COUPLINGS

Dresser Manufacturing Division, 59 Fisher Avenue, Bradford, Pa. (One of the Dresser Industries). Houston Office and Warehouse: 1121 Rothwell Street, Houston, Texas. Sales Offices: New York, Chicago, Houston, San Francisco.

# "PERFECT CIRCLE" Cementing



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**Thousands of successful cementing jobs have proved that the Larkin Geyser Shoe does all that a cementing shoe can do toward a successful cement job.**

**The Larkin Geyser Shoe**

**.... distributes cement slurry evenly around the casing.**

**.... imparts a jetting action that washes mud cake from the well bore.**

**.... guides and floats safely and efficiently casing strings of any size to any depth.**

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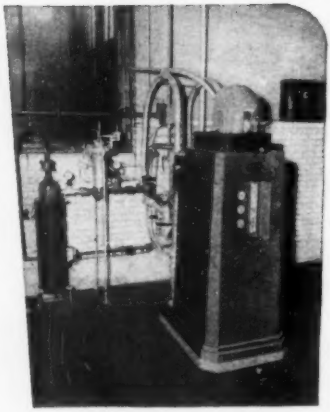
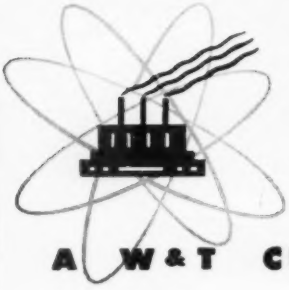
# SAXTON'S SECRET WEAPON . . .



W&T Chlorinator Installation at Saxton Station



## A W&T CHLORINATOR

In winning their battle against condenser slime at the Saxton Generating Station, Pennsylvania Electric Company, in their company publication, called the Wallace & Tiernan Chlorinator their "Secret Weapon."

Here's what happened before chlorine was tried. Experience showed even a small accumulation of slime caused a one inch loss in condenser vacuum — equivalent to a five to ten per cent reduction in plant efficiency. Frequent mechanical cleaning — expensive and disagreeable — still left a thin layer of slime. Cleaning compounds involving acids and alkalis were found an unsatisfactory answer to the problem.

Then Chlorine was tried! Preliminary tests indicated that coal consumption could be decreased by about $75 per day. *But*, feeding chlorine without special equipment proved both expensive and dangerous. A slight variation in feed rates resulted either in insufficient treatment or excessive chemical costs.

As a result of these tests, a Wallace & Tiernan Automatic Chlorinator was installed at Saxton in May 1949. This precision chlorinator made possible reduced coal consumption and virtual elimination of mechanical tube cleaning — the reasons why a W&T Chlorinator is Saxton's "Secret Weapon."

Hundreds of power plants have had benefits similar to those at the Saxton Station. Your W&T Engineer is prepared to help solve your slime problems — why not write for more information today — no obligation, of course.

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**WALLACE & TIERNAN PRODUCTS, INC.**

CHLORINE AND CHEMICAL CONTROL EQUIPMENT

Belleville 9, New Jersey • Represented in Principal Cities


annual meeting, Cosmopolitan Hotel, Denver, November 15-17.

Society of Exploration Geophysicists, regional meeting, Baker Hotel, Dallas, November 19-20.

Mid-Continent Oil and Gas Association, annual board of directors meeting, Tulsa Club, Tulsa, November 20.

American Society of Mechanical Engineers, annual meeting, Chalfonte-Haddon Hall, Atlantic City, November 25-30.

Twenty-third Exposition of Chemical Industries, Grand Central Palace, New York City, November 26-December 1.

**December**

American Institute of Chemical Engineers, annual meeting, Chalfonte-Haddon Hall, Atlantic City, December 2-5.

Chemical Specialties Manufacturers Association, thirty-eighth annual meeting, Mayflower Hotel, Washington, D. C., December 3-4.

Natural Gasoline Association of America, Panhandle-Plains regional meeting, Herring Hotel, Amarillo, Tex., December 7.

New York Oil Heating Association, Inc., Hotel Statler, New York City, December 10.

American Association for the Advancement of Science, annual meeting, Philadelphia, December 27-28.

**1952 Meetings**

Society of Automotive Engineers, annual meeting, Hotel Book-Cadillac, Detroit, January 14-18.

American Association of Petroleum Geologists, Rocky Mountain Section, second annual convention, Salt Lake City, February 28-29.

American Society for Testing Materials, spring meeting, Hotel Statler, Cleveland, March 3-7.

National Association of Corrosion Engineers, eighth annual conference and exhibition, Galvez Hotel, Galveston, Tex., March 10-14.

American Institute of Chemical Engineers, regional meeting, Atlanta, March 16-19.

American Petroleum Institute, Division of Production, Mid-Continent district meeting, Broadview Hotel, Wichita, Kans., March 19-21.

Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, April 8-10.

Southern Gas Association, annual convention, Galveston, Tex., April 28-30.

American Institute of Chemical Engineers, regional meeting, French Lick, Ind., May 11-14.

American Gas Association, Natural Gas Department spring meeting, Biltmore Hotel, Los Angeles, May 12-13.

American Petroleum Institute, Division of Refining, seventeenth midyear meeting, San Francisco, May 12-15.

American Gas Association, production and chemical conference, Hotel New Yorker, New York, May 26-28.

Canadian Gas Association, Chateau Frontenac, Quebec, June 8-12.

American Petroleum Institute, midyear standardization meeting, Brown Palace Hotel, Denver, June 9-14.

American Society for Testing Materials, annual meeting, Hotel Statler, New York, June 23-27.

**NOMADS**

**Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.**

**Dallas - Fort Worth Nomads, first Monday of each month, Greater Dallas Club.**

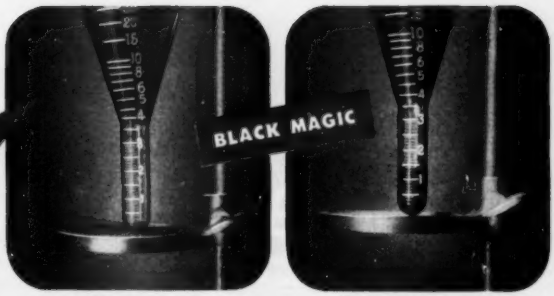
**Houston Nomads, second Monday of each month, Ye Ole College Inn, Houston.**

**Los Angeles Nomads, second Wednesday of each month, Jonathan Club.**

**New York Nomads: October 1 and October 29, regular meetings, Louis Sherry's; December 8, Christmas dinner dance, Hotel Pierre.**

# ONLY BLACK MAGIC STANDS UP

under high temperatures and high pressures

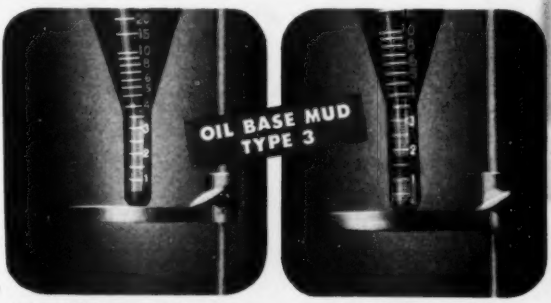



Zero fluid loss at room temperature. 1.3 c.c. fluid loss at 250°F.

**NATURE OF THE FILTRATE**—*No water. Slightly colored diesel oil with small amount of oil soluble asphalt in solution which is entirely soluble in crude oil. Nothing here to cause trouble. By the addition of a small quantity of plastering material (OB Gel) this fluid loss can be reduced to zero.*

Zero fluid loss at room temperature. 2.5 c.c. fluid loss at 250°F.

**NATURE OF THE FILTRATE**—*Dark colored diesel oil containing sodium silicate, sodium tallate, and 0.1 c.c. water. Sodium silicate is used to make cement reservoirs, sands, etc., impervious to oil. Sodium tallate forms an insoluble precipitate when in contact with calcium and magnesium salts under certain conditions. A filtrate of this nature would be extremely difficult to remove from the pores of an oil sand formation.*




0.4 c.c. fluid loss at room temperature. 1.7 c.c. fluid loss at 250°F.

**NATURE OF THE FILTRATE**—*0.6 c.c. crude oil containing a polyvalent resinate and 1.1 c.c. water. Water is used to kill wells and its damaging effects to producing zones is now common knowledge. Polyvalent resinates may be precipitated from the filtrate by contact with a crude oil having different properties. This insoluble resinate in the oil zone can well cause a definite blocking action.*

There are three commercial oil base muds available today. This simple laboratory test was made to compare the performance of all three under pressure and temperature. Samples of each mud were taken directly from wells during drilling. An ordinary API-size filter press was used. All tests were made at 100 p.s.i. for a period of 60 minutes—*All tests were identical*—It is safe to assume that what occurred here also takes place under actual drilling conditions. For more information on these tests write for free copy of Third World Petroleum Congress paper—"Oil Base Drilling Fluids."

## What this test means

An oil base mud is used to complete wells to prevent water "blocking" and "mudding off" of the oil zone, to combat heaving shale, for diamond coring, for its better plastering ability and for improving drilling conditions in general. If the mud has a high fluid loss, it defeats its own purpose. A filtrate has the ability to carry clay particles, weighting materials etc., and the greater the filtrate loss of the mud, the thicker the mud cake deposited on the walls of the hole. If harmful, insoluble filtrates are also deposited to block the oil bearing formation, then nothing constructive has been accomplished. A serious fluid loss also causes viscosity and oil make-up problems to further complicate matters.

**To get greater production from your wells, to avoid mud maintenance difficulties, use Black Magic—the only drilling mud that stands up under severe well conditions when others fail.**

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Published every Thursday by The Petroleum Publishing Co., 211 S. Cheyenne, Tulsa, Oklahoma. Founded in 1902. Name changed to The Oil and Gas Journal in 1910 by Patrick C. Boyle.

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Subscription rate to the petroleum industry, United States and foreign, 1 year, $6.00. Single copies, 50 cents. Back copies when over a year old, one dollar. Note: Payments from outside the U.S.A. may be in the form of an international money order or check on a U.S.A. bank. Entered as second-class mail matter at Tulsa, Okla., under Act of March 3, 1879. Copyright 1951 by The Petroleum Publishing Co.

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# JOURNALLY Speaking

## Ancient Monopoly

THE Israeli Government, we understand, has revised its petroleum laws so that if oil is discovered within its boundaries there will be no chance of an extortionate monopoly. This attests to the long memories of the Jews and their deference to their troubled history, for once before Israel was oppressed by an oil monopoly.

That was a monopoly on olive oil, but in those days olive oil served many of the needs now filled by petroleum, so the parallel is not too remote. The infamous incident, involving an operating margin of 800 per cent, was recorded by Flavius Josephus, the celebrated Jewish historian, and was extracted for this department by a reader (yes, we have a few).

"Now as Josephus was thus engaged in the administration of the affairs of Galilee," the history says in Volume III, Chapter 21, "there arose a treacherous person, a man of Gischala, the son of Levi, whose name was John. His character was that of a very cunning and a very knavish person, beyond the ordinary rate of other men of eminence there, and for wicked practices he had not his fellow anywhere. . . .

"He after that contrived a very shrewd trick, and, pretending that the Jews who dwelt in Syria were obliged to make use of oil that was made by others than those of their own nation, he desired leave of Josephus to send oil to their borders; so he bought 4 amphorae with such Tyrian money as was the value of 4 Attic drachmae, and sold every half amphora at the same price. And as Galilee was very fruitful in oil, and was peculiarly so at that time, by sending away great quantities and having the sole privilege to do so, he gathered an immense sum of money together, which money he immediately used to the advantage of him who gave him that privilege. . . ."

Josephus went on to record that this early-day oil baron used his wealth and power to try to overthrow the government, and caused all manner of trouble along the shores of Galilee. Things like that never happen nowadays, of course, but the Israelis are not a people to be hooked twice by the same deal.

## Global Concept

COMMISSIONER ERNEST O. THOMPSON of the Texas Railroad Commission is one Texan who finds his state too small for him. Not content with helping to run the oil industry of Texas, which is one-quarter of the world's oil, and with being a big wheel in the Interstate Oil Compact Commission which takes in another quarter, the red-headed and irrepressible lieutenant general now has his eyes on the other half which lies outside our borders.

He got this idea while attending the World Petroleum Congress in Holland last summer, and in a glowing report to the Compact Commission he said that the WPC holds the seeds of a world oil compact which could well be modeled after and function like the IOCC to promote global conservation and help keep the industry of the entire planet operating on a more or less even keel.

Since the WPC meets only every 4 years while the IOCC meets three times a year, the general's suggestion for one oil world may be slow to fructify, the state of international amity being what it is at present. The Russians might be a bit of a problem, but the general explained that in Holland the Soviet delegates very neatly vetoed themselves out of the meeting. The WPC rules forbade discussion of politics, and the Reds announced that politics and economics are the same thing, so, because every subject of conservation and technology had some economic angle to it, the Russians walked out on the whole thing and were no bother at all.

## Plugged and Abandoned

MAN in Corsicana, Tex., according to the newspapers, dug a well for water, struck oil at 35 ft., didn't know what to do with it, shoveled the dirt back in, abandoned the hole.

More than 50 years ago in Corsicana another man dug a well for water, struck oil, and knew what to do with it. That's how and where the oil industry started in Texas, before Spindletop. Apparently opportunity knocks but once in Corsicana.

—*Henry D. Ralph.*

# I'M A "BELIEVER," NOW!

Yes, I'm the "rugged individualist" type . . . you know, "Stand on your own two feet," etc. I started in the producing and refining business when you had to be a jack-of-all-trades. You did everything yourself, pretty much, so I thought nobody could tell me anything about my business.

Then my business got bigger, and I got a little older, and there just seemed to be too many details to have to bother with. Well, to make a long story short, a fellow from Anchor called me up one day and asked me to lunch.

I knew he was going to make a pitch of some kind, and he did, finally . . . sort of. We got to talking over our coffee and I was kind of unloading on him about all my troubles. He had been in the business a long time, too, so he could sympathize.

He cut into my dirge with a question . . . "Why don't you get rid of some of your troubles? It's easy."
I thought, "Here it comes, the pitch." But I acted like a good straight man . . . after all he was buying the vittles . . . and asked him what he meant.

"Well," he says, "Anchor could take all your marketing problems off your hands. Marketing, today, requires specialists. That's what Anchor is, a specialist in marketing and distribution. Turn those problems over to us and you'll have more time to take that grandson of yours fishing."

He sounded sincere, and believable, so I gave him the nod. It was one of my better decisions. I've had more time to give to what I know best, and little Jimmy is getting to be a real fisherman.

Let me tell you about last weekend! You know, he's only nine, but he caught the prettiest big-mouth — pound and a half, or two-pounds, anyway. Played him like a veteran. He was using . . . Oh, you have to go? Well, listen, take my advice! If you want to buy or sell petroleum products — Call Anchor First — ANCHOR BUYS AND SELLS . . . LPG, Diesel Oil, Fuel Oil, Kerosene, Natural Gasoline, Gasoline, Naphtha and Other Petroleum Products.

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The OIL AND GAS JOURNAL

September 27, 1951

VOL. 50, NO. 21

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Kenneth B. Barnes

NEWS EDITOR
Henry D. Ralph

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900 Fifth Avenue, New York

INTERNATIONAL EDITOR
Dahl M. Duff
900 Fifth Avenue, New York

PIPE-LINE EDITOR
Paul Reed

TECHNICAL EDITOR
W. L. Nelson

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## • NEWS FEATURES

Unfavorable Economic Conditions Plague Drilling Contractors, A.A.O.D.C. Told 47
Public Must Be Educated to Accept Gas-Rate Increases, I.N.G.A.A. Warns 48
Electronic Analyzer Seen as Aid to Pumping Problems, A.S.M.E. Hears 49
Process Pilot Plants Discussed During Tulsa A.S.M.E. Meeting 50
Texas Railroad Commission Denounces Flaring of Gas; Oil Allowable Set 51
Water-Disposal "Backfire" Lifts Reservoir Pressure in Michigan Field 51
Accord Seen in Tidelands Controversy 52
Du Pont to Try Underground Disposal of Chemical Wastes 53
PAD Official Says Gasoline Rationing Possible in the Future 53
Revision of Tubular-Goods Distribution Plan Considered by PAD 54
Oil, Coal Producers to Resist Any Increased Petroleum Imports 54
Navy to Continue Search for Oil in Alaska 56
Accelerated Amortization O.K.'d for 136 Oil Projects 56
Big Texas Eastern Expansion Program Moving Ahead on Schedule 58
World Crude-Oil Production Drops 59
Europe's Crude Source Is Middle East, Egloff Says 62
Iran May Eject British Technicians From Abadan Refinery 66
Colombia Products Line Work to Start Soon 66

## • ENGINEERING-OPERATING FEATURES

Making Hole Through Thick Conglomerate 72
A New Electrical Analyzer for Study of Oil-Field Behavior 76
Radioisotopes—Their Use in the Petroleum Industry 82
Electrical Engineering's Contribution to Oil 94
A Method of Estimating Gas Reserves 99
Venice Refinery Undergoing Expansion 104
Progress in Metals 108
Corrosion Control: Interference Effects in Cathodic Protection 113
Refiner's Notebook: Further Classification of Refractories 115
Engineering Fundamentals: Wellability and Flood Calculations 117

## • EXPLORATION-DEVELOPMENT

Western Kansas' Mississippian 137
Highlights of Week's Developments 137
Reports by Areas Start on Page 138
Summary of Completions for August 1951 153

## • REGULAR DEPARTMENTS

They Say 35
Calendar of Events 36
Journally Speaking 41
Editorial 45
This Week 46
Watching Washington 55
International News 59
Personals 68
Deaths in the Industry 70
Natural-Gas News 123
Natural-Gasoline News 137
Drilling Contractors 124
Pipe-Line News 128
Refining News 133
Exploration Statistics 154
Production Statistics 155
Refining Statistics 156
Market Statistics 157
Equipment Men in the News 158
Classifield Advertising 160
Advertisers' Index 165

# BAKER

## The "FIRST" Name in Floating Equipment

### "First" in the Field

To have been the pioneer in developing and marketing floating equipment means little unless the wealth of knowledge acquired through years has been utilized to attain the position of "leadership" today.—By studying the performance of Baker Floating Equipment in cementing thousands of wells; by continuous "pioneering" as new materials could be incorporated into proven, as well as experimental designs, Baker always has maintained the lead, and is today unquestionably "First" in the Field.

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Success in cementing means only one thing—to secure a leak-proof water shut-off with the initial cement job—and Baker Floating Equipment offers you the best possible opportunity to secure such success. Let us consider the features of Baker Equipment which contribute to Successful Results... Seamless steel collar stock, threaded to *exactly* fit your casing, is a long-time Baker "Standard." The rounded nose of all Baker Shoes is made of "Baker Formula" Cement, and will safely guide the casing past all side wall irregularities. The famous Baker Buoyant Ball permits free passage of the cement slurry; then, at the slightest reversal of pressure, floats to a leak-proof seal against the recessed, abrasion-resistant rubber ring.—All internal construction consists of easily drillable materials, with *no metal* to drill out or to interfere with diamond coring immediately below the shoe. The bit meets the very minimum cross-sectional area of plastic (and no metal) when drilling out, and quickly reduces the cement and plastic to harmless fragments which circulate out of the hole.

### "First" and ONLY "Whirling" Action

This exclusive Baker development is widely used by operators who are willing to pay slightly more for this added assurance of success, especially when bridges are present in the hole. The baffled side ports in Baker WHIRLER Equipment direct the fluid at an angle against the walls of the hole, and this action combines with the hydraulicking effect of the fluid through the bottom of the shoe to remove bridges and permit safe landing of the casing. In addition, the well is conditioned to permit bonding of the slurry with the formation.

### "First" in Popularity

Here is a "First" possible only because you (and thousands of other operators) have been quick to recognize tools and methods which *provide dependable performance*. It is both a challenge and an inspiration to work with men who *insist upon results*—a challenge to supply their present needs, and an inspiration to meet their demands of tomorrow. Baker will always be ready!

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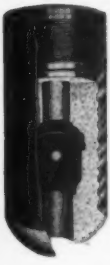
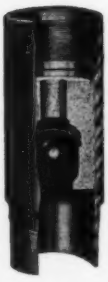
## NO METAL • NO TRICKS • NO TROUBLE DRILLING OUT



**This is Product No. 100—Baker Cement Float Shoe—outstandingly "First" for the safe guiding, floating and cementing of casing. No other shoe approaches its world wide popularity. Available also in the "Whirler" Type at a nominal increase in price.**

**This is Product No. 102—Baker Cement Guide Shoe. Used in combination with a Baker Cement Float Collar when one float valve is considered sufficient, and a stop for the cementing plug is desired above the shoe.**



**This is Product No. 101 M&F—Baker Cement Float Collar—usually positioned just above the shoe joint to provide a "stop" for the cementing plug. Used in combination with any type of Baker Cement Shoe selected to meet customer's specifications.**

## Brings "LASTING" Results

# More Refineries Needed

More refining capacity is the greatest need of the petroleum industry today, in the opinion of a number of the industry's leaders. This conclusion is voiced in spite of the big expansion program of the past 2 or 3 years. Refining capacity is not keeping pace either with the rising demand or the availability of crude.

For the world as a whole this condition seems quite apparent. The crude lost by the Iranian shutdown has been more than made up already and still additional crude could be put on the world markets within a short time. But the loss of products from one refinery, Abadan, cannot be offset by all the other refineries in the world.

In the United States the situation may be similar within a year or two. Our practical refining capacity currently is around 6,700,000 bbl. daily, but total demand for petroleum products (including those of natural-gasoline and cycling plants) will average about 7,500,000 bbl. a day this year.

We can produce in this country something in the neighborhood of 6,700,000 bbl. of crude oil daily, though more pipe lines would be needed to get all of this to refineries. For several years a considerable portion of our refinery feed has been imported crude. There are also some exports of crude and sizable imports and exports of products. Without going into the details of these it can be said that the net prospect is that the volume of products that can be expected from domestic refineries and from normal import sources totals very little more than the probable demand.

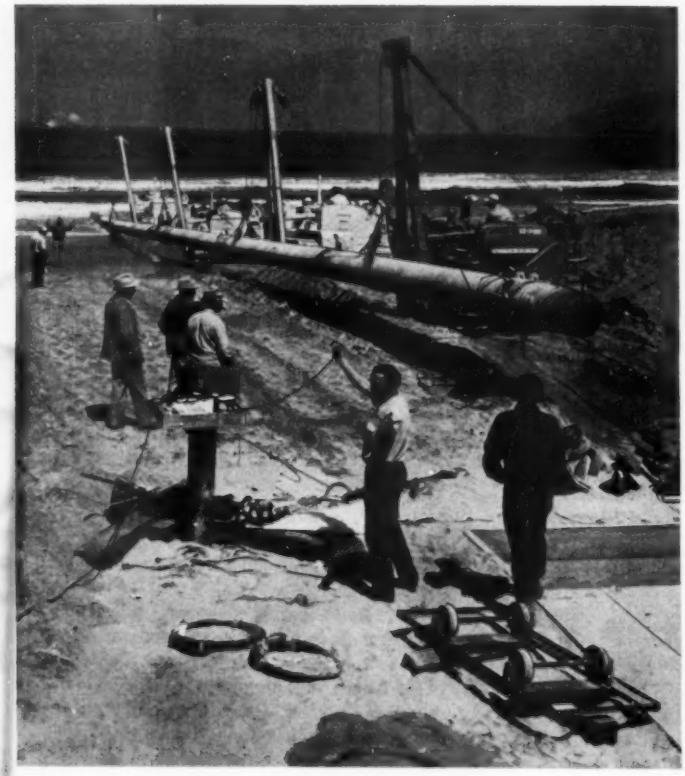
If normal sources of foreign crude remain available, the United States should have the feed stock for considerably more refining capacity than exists at present. The big drilling program now in progress can be counted on to increase our producing ability, and pipe-line construction is proceeding at about the limit of the capacity of rolling mills to turn out pipe.

It takes a long time to build refineries under any conditions, and the restrictions imposed by the defense program are delaying construction now under way. Early this year the industry undertook a program to add 1,000,000 bbl. of capacity within 2 years. This was calculated to take care of the expected increase in consumption with only a small extra cushion.

Now it appears that materials are so short that it will take 3 years instead of 2 to add this million barrels but that during this period demand will have increased faster than was anticipated. This adds up to a probable shortage of refining capacity within a couple of years and no cushion for a national emergency.

A reserve crude-producing capacity is mighty fine to have, but all the crude in the world is useless without refining capacity. Those leaders of industry and government who are attempting to guide the oil industry's expansion in a controlled economy should redouble their efforts to keep refining capacity in balance with requirements.

# THIS WEEK



*OUT TO SEA.—Crew moves in the last 250-ft. section of Union Oil Co.'s new 20-in. submarine line which extends 4,800 ft. into the Pacific Ocean from the tanker-loading terminal near Ventura, Calif. The pipe line, longest submarine oil carrier on the West Coast, was given an inner lining of ¾-in. concrete and a 2-in. exterior coating of concrete and asphalt. Using a small railway and with pipe welded into 250-ft. sections, laying operations were completed in 40 hours.*

**STEEL**—PAD considering revision of tubular-goods distribution plan after talk with trade-association representatives. . . . ¶Nation faces gasoline, home-heating-oil rationing in future unless adequate steel can be provided to petroleum industry for sufficient drilling, refining increase, PAD official declares. . . . ¶Supply of 3,000,000 tons of steel scrap necessary if steel industry is to reach its 118,000,000-ton target next year, defense officials warn. . . .

**PRODUCTION**—Texas' crude-oil-production allowable set at all-time high of 3,115,512 bbl. daily for October. . . . Railroad Commission denounces increased flaring of natural gas, hints steps will be taken to further curb this practice. . . . ¶World crude-oil production fails to set new record for first time this year, with 11,703,800-bbl. daily average in July. . . . ¶Water-disposal wells lifts reservoir pressure in Michigan field in unusual manner. . . .

**WASHINGTON.**—Tidelands accord seen by determination of various factions to compromise. . . . ¶Petroleum, coal producers will resist any attempt to increase imports of oil and products, say if Iran comes back into world oil picture surplus of foreign oil may develop and be dumped on United States. . . . ¶Critical shortage of sulfur through final quarter of this year may force NPA to curtail use by 15 per cent or cut consumer inventories from 3-month to 25-day supply. . . . ¶Accelerated amortization approved for 136 petroleum projects. . . . ¶Navy does "about face," plans continued search for oil in Alaska. . . .

**ACTIVITY**—Crude production averaged 6,222,450 bbl. daily for the week ended September 22, up 21,950 bbl. daily. . . . ¶Total completions increased to 920 wells from 865 for the previous week. . . . Wildcat completions totaled 221 wells compared with 211 for the previous week and 168 for the same week last year. . . . ¶Rotary rigs operating in the United States on September 17 decreased to 2,748 from the all-time high of 2,783 a week earlier. . . .

**TRENDS**—Primary distillate stocks increased 47,792,000 bbl. between April 30 and September 15. . . . The buildup was 30.6 per cent greater than last year. . . . ¶Summer additions to distillate stocks in District 1 were 51.7 per cent greater than last year. . . . District 2 stocking was up 44.6 per cent. . . . District 3 added only 10.7 per cent more than last summer. . . . ¶Accumulations in Districts 4 and 5 were less than in summer of 1950. . . .

**INDUSTRY**—Drilling contractor faced with unfavorable economic conditions which must be overcome quickly, A.A.O.D.C. president declares. . . . ¶Public, regulatory bodies must be educated in favor of rate increases, I.N.G.A.A. warns, citing increased operating expenses which make boosts necessary. . . . ¶Electronic calculators can aid in solving complex pumping problems, A.S.M.E. hears. . . . ¶Group also reminded of advances in refining technology made possible by process pilot plants. . . .

**INTERNATIONAL**—Iranian authorities studying possibility of ejecting Abadan technicians without formality of ultimatum to British. . . . ¶Work to start on main-line construction of 87-mile products line from Puerto Salgar to Bogota, Colombia. . . . ¶Increasing demands of Europe's refineries must be met by Middle East oil, Egloff says. . . . ¶Denmark plans 2,000-bbl. thermal cracking plant, country's first refinery. . . . ¶Colombia's Barrancabermeja refinery expansion assured by $8,000,000 loan. . . .

# Driller's Plight

## Unfavorable economic conditions which plague him must be overcome quickly, Thompson declares to A.A.O.D.C.

**Kenneth B. Barnes**

FORT WORTH—Unhealthy economic conditions continue to plague the drilling contractor, and unless these problems are solved, the inevitable result will be damaging to the petroleum industry and the nation as well as to the contractor himself.

This was the opinion of A. W. Thompson, partner in Thompson-Carr Drilling Co., Houston, and president of the American Association of Oilwell Drilling Contractors, in addressing members of the association at its annual meeting here. Thompson was reelected head of the group for another year.

*A. W. THOMPSON*

These unhealthy conditions are in spite of the fact that the contracting industry has been favored during the past few years with greatly increased drilling volumes and the outlook for further substantial expansion, Thompson said.

**Major factors.**—Major factors in the trend toward increased drilling costs, Thompson stated, are: (1) Higher costs of wages, equipment, and operating expenses; (2) greater depth of wells; and (3) the larger proportion of exploratory or wildcat wells being drilled.

"Although the average rate of penetration is 50 per cent greater than 5 years ago," he said, "the drilling industry has been only partially able to offset growing costs by increased efficiency. Further advancement of drilling efficiency offers the greatest hope for contractors to improve the relationship between expenditures and revenue."

**Footage to rise.**—Footage drilled, Thompson said, is expected to reach an all-time high of 172,000,000 ft. in 1951, and increase of 7.7 per cent over the 159,000,000 ft. drilled in 1950, two-thirds greater than in 1946 and almost twice the level of 1940.

"Included in this sharp gain in drilling rates," Thompson said, "is the growth in the completion of wildcat tests."

The slightly more than 9,100 wildcats predicted in 1951 would be more than two and one-half times the prewar peak of 3,409, he said, and more than double the 4,242 drilled in 1946. However, the amount of oil discovered has not kept abreast of this increased wildcatting campaign. During the five postwar years the amount of new oil found was equal to slightly less than 500,000 bbl. per wildcat completed, or half the prewar ratio, he said.

"Also, increased drilling rates have not kept abreast of the gain in production. Completion of 45,000 wells this year will represent only about 20.4 wells per million barrels produced, while less activity in 1950 resulted in the drilling of 21.9 wells per million barrels. In 1937, 10,000 fewer wells were completed, but they were equivalent to 27.5 completions per million barrels."

This presages a need to increase drilling in coming years "far above current peaks to provide enough producing ability to fulfill requirements," he declared.

"It seems probable that the drilling of 50,000 wells annually will be necessary within a few years, and even larger quantities in the not-distant future.

"The current drilling of 45,000 wells annually in the United States means that the nation's approximately 5,250 rigs of all kinds must drill an average of nearly nine wells each, or one well per rig every 5¾ weeks," Thompson said. "When time for moving and rigging up is considered, about 35 days are available as an average for actual drilling operations per well," he reported.

Eighty-two per cent of all United States drilling now is done by the rotary method, Thompson said, in contrast with but 67 per cent in 1945. "This gain, coupled with the increase in total United States drilling since 1945, has doubled the indicated number of wells drilled by the rotary method. At the current rate of completing wells, nearly 37,000 wells are being drilled yearly by rotary rigs in comparison with only 18,000 in 1945."

**Big business.**—"Of the work done by contractors this year," Thompson pointed out, "rotary drilling will account for an estimated 140,000,000 ft. of hole, thereby representing a gross rotary-drilling business of nearly $900,000,000."

Citing how the drilling-contracting business has grown, Thompson said that surveys indicate that contractors own 4,500 rigs, 85 per cent of the 5,250 rigs in the nation. The remaining 750 rigs are owned by noncontract producing concerns. Contractors' rigs, he said, consist of approximately 3,200 rotaries and 1,300 cable-tool rigs.

"Replacement of these rigs at today's high equipment prices," he said, "would entail the expenditure of at least $1,000,000,000."

**Crooked holes.**—Crooked holes have been with the industry for many years, Bruno Schabarum, general manager of Carl B. King Drilling Co., Midland, Tex., told the A.A.O.D.C., but added that they were not much of a problem in the Permian basin of West Texas prior to 1945.

Schabarum pointed out the use of drilling weights prior to that time of about 15,000 lb. on 8¾-in. bits, and about 12,000 lb. on 6¾-in. bits, as compared to between 40,000 and 60,000 lb. on the larger bits and from 20,000 to 40,000 lb. on the smaller bits today.

"These additional weights," he said, "are being obtained by running drill collars and even though they are stiffer than the pipe, the formation still exerts a sufficient reaction to cause the hole to deviate in some cases."

Because wells are being drilled deeper and faster, Schabarum said, the problem of crooked holes will become more expensive and more significant, and urged the industry to undertake a study of the problem. This, he said, could entail formation of a committee to be sponsored by A.A.O.D.C., and to be composed of representatives of drilling firms and oil operators.

**Lost circulation.**—In his paper on "Lost Circulation—Causes and Remedies," H. J. Shumate, zone drilling engineer for Gulf Oil Corp., Odessa, Tex., stressed the growing need for a solution to the problem, "which has become more serious with drilling to greater depths and with expanded wildcatting programs."

Shumate said that the problem can be divided into two parts: (1) Those instances of mechanical nature in which the loss in circulation results from drilling techniques employed; and (2) those which result from a condition inherent in the formation, merely awaiting penetration of the bit.

Control methods employed on a test well in Peach Point field of Brazoria County, Texas, was cited as an example in an approach to the first portion of the problem. By preventing surges of pressure in excess of the tensile strength of the formations, these control methods resulted in the completion of the well "without a single loss of circulation—as compared with a previous history of 79 losses on three prior wells in the same field."

Losses in circulation resulting from

porous, cavernous, or fractured formations, he declared, are prevalent in the Permian basin and deep wells in the Delaware basin promise to provide many circulation problems when activity in that area increases. Shumate also discussed success in eliminating lost circulation by use of compressed air or gas as the circulating medium.

**Rotary-drilling lines.**—In a paper on evaluation of rotary-drilling lines, J. U. Teague, president of Columbia Drilling Co., Houston, asserted that a reduction in drilling-line costs can be accomplished by many operators and contractors, by: (1) Keeping current and accurate service records on each line, preferably at the rig where line is in use; (2) using longer lines and cutting off short lengths at regular intervals; (3) using larger-diameter lines; and (4) exercising care in handling and using wire lines.

Higher prices today on wire line and increased costs of wire line resulting from deeper drilling make this especially important, he said.

**Manpower in drilling.**—Earle C. Flesher, partner and manager of Johnson & Flesher Drilling Co., Oklahoma City, warned of the "draining off" of trained personnel from the manpower pool in the drilling industry by competitive industries.

"It is important in any consideration of this problem that most other industries competing with the drilling industry for intelligent and capable young men now have some type of benefit program and are paying wages as high as those in the drilling industry," he said.

Flesher suggested that drilling contractors "should take a cue" from these significant trends.

In another paper delivered before the meeting C. S. Wilson, engineer of tests for Southern Pacific Lines, Houston, described the development of lubricating oils to meet demands of high horsepower diesel engines, particularly those oils using additives. He outlined procedures for testing properties of lube oils under operating conditions.

**Spencer speaks.** — "Contributions of Drilling Contractors Toward Oil Needs of Tomorrow" was the address at the annual convention banquet, by P. C. Spencer, New York City, president of Sinclair Oil Corp. Business—certainly for the near-term—really looks good for the drilling contractor, he said. Speaking humorously, Spencer added, ". . . and I am almost persuaded to go into the business myself."

The Sinclair president paid a forceful compliment to the drilling industry all down the line. He underscored the story of the development of oil-well drilling tools, equipment, and the technical know-how which has made possible drilling of wells more than 3 miles deep, "one of the most dramatic and outstanding examples of the inventive genius and resourcefulness of Americans and American industry."

On the longer-term future Spencer was confident there is nothing on the competitive horizon for the oil industry or the drilling contractor to fear. Both are fully capable, with plenty of experience, he said. Previously Spencer had touched, in a lighter vein, on atomic-energy applications in industry, synthetic-liquid fuels, and "oil-drilling rockets."

But Spencer did warn A.A.O.D.C. gathering that an unsatisfactory political and economic climate is one in which "there is lack of incentive or opportunity to explore and drill for oil," either because of profits not adequate with risks, excessive taxation, too restrictive rules and controls, or other causes destroying incentive to deep oil production.

A. C. Rubel, vice president, Union Oil Co. of California, spoke on "The Drilling Contractor and the Oil Company."

**Officers.**—New officers, in addition to Thompson, who was reelected president, are: Joseph V. Dunbar, Dunbar Drilling Co., Salem, Ill., reelected vice president; R. S. Makin, Makin Drilling Co., Hobbs, N. M., vice president for West Texas and New Mexico; Harold M. McClure, McClure Drilling Co., Alma, Mich., reelected vice president for cable tools; Earle C. Flesher, Johnson & Flesher Drilling Co., Oklahoma City, vice president for the Central Mid-Continent area; A. H. Bell, Bell & Burden, Inc., Los Angeles, vice president for California; Thomas S. Doran, Vandalia, Ill., vice president for Illinois, Michigan, Indiana, and Kentucky; N. H. Wheless, Jr., Wheless Drilling Co., Shreveport, vice president for Cretaceous and Tertiary basins; E. K. Carey, E. K. Carey Drilling Co., Denver, vice president for the Rocky Mountains; and H. H. Hillman, California Production Service, Inc., Long Beach, vice president for well servicing.

# Big Job Ahead

## Educational program designed to overcome resistance to rate boosts essential to gas industry, I.N.G.A.A. told

**Henry D. Ralph**

OKLAHOMA CITY.—The natural-gas industry faces a big educational job to overcome resistance of the consuming public and regulatory bodies to increased rates which must be obtained to offset higher interest charges, higher field prices of gas, and rising operating costs, the Independent Natural Gas Association of America was told at its annual meeting September 24.

Paul Kayser, president of El Paso Natural Gas Co., Houston, in his report as president of the association, pointed out that during the period of decreasing costs the Federal Power Commission and the state utility commissions continuously reduced rates to keep earnings at 6 per cent on investment and now these agencies have a similar duty to keep rates going up commensurate with costs so as to retain the same rate of earnings.

The same thought was expressed by C. P. Rather, head of the gas division of the Petroleum Administration for Defense, on leave from the presidency of Southern Natural Gas Co.

"There are rate increases of nearly $100,000,000 per year pending before the Federal Power Commission, partly because of increased prices paid the producer," Rather said. "When the impact of these increases hits the public, sound explanations will be required. These increases in rates, without adequate explanation, can bring about very unhappy results for everyone involved, including the producer."

**Other problems.** — Other important problems facing the gas industry listed by Kayser include:

The attempt of the Interior Department to force all gas lines crossing public lands to operate as common carriers, which would break down the foundation on which the business has been built and financed, and would impose burdens far beyond those imposed on any other type of utility.

Need for a simple federal law giving gas companies the right of eminent domain to acquire rights to underground-storage reservoirs in order to hasten construction of storage near consuming points to permit meeting peak demands, reduce cost of servicing large cities, and assist conservation.

Possibility that the Office of Price Stabilization may impose ceilings on prices that may be paid for gas in the field.

Pending legislation to impose safety requirements on natural-gas companies.

**PAD activities.**—Reporting on the gas activities of PAD, Rather said that all the line pipe requested by the industry had not been obtained but that sufficient pipe had been delivered to permit all but two of the large projects under way to be put into service this winter.

The other major gas problem facing PAD, he said, is winter allocation of gas in areas where supplies will not be sufficient to fill demands. He predicted that PAD may have to issue discriminatory limitation orders to cut off industrial users who can burn coal in order to prevent other users from switching from gas to oil in areas where fuel oil may be short.

**Alarm voiced.**—Alarm at the rapid

export of natural gas from producing states of the Southwest was expressed by Gov. Johnston Murray of Oklahoma in opening the convention. He urged producers to join in a campaign to keep the gas for use near areas of production rather than to promote additional long-distance pipe lines, but did not suggest legislation to prevent new lines.

**Shortage forecast.**—A prediction that fear of federal regulation will foreclose new supplies of Southwest gas to eastern consumers was made in an address prepared by Sen. Robert S. Kerr of Oklahoma. During the congressional fight which led to the veto of his bill to exempt producers from jurisdiction of Federal Power Commission, he recalled consuming interests said that the Kerr Bill would result in higher gas prices while he said the effect would be the opposite.

Now, the senator said, because the bill was vetoed gas is being kept off the market, prices are rising rapidly, and interstate companies which want to build new lines or expand old ones are unable to obtain additional supplies.

During the 18 months since the veto, Kerr said, petrochemical and other gas-using industries have been flocking into the Southwest and are using far more gas than a big pipe line would take, and he predicted that this trend will accelerate and that very little new gas will be sold to interstate pipe lines so long as there is any chance that such sales might be regulated as public utilities.

The main feature of the program was a panel discussion on underground-storage reservoirs for natural gas, presided over by Scott Hughes, of Southern Union Gas Co.

**Big project.**—The big project now being constructed by Texas Illinois Natural Gas Pipe Line Co. at Herscher, near Kankakee, Ill., was described by J. J. Hedrick, president. He explained the exploration work required to locate and test this salt-water anticline which is being developed to store from 90 to 200 billion cubic feet for the Chicago area.

Methods of using depleted gas fields for underground storage were described by John L. Gere, of Cities Service Gas Co. The greatest problems here, he said, are in locating logs of old wells, cleaning out and replugging abandoned wells, and reworking wells to serve the storage stratum in order to prevent leaks.

**Reservoir types.**—As between the two types of storage, a water reservoir is much superior to an old gas field, it was declared by Dr. I. I. Gardescue, of Transcontinental Gas Pipe Line Corp. Unless the old field had a water drive, he said, storage space must be created by compressing the gas back into the voids left by the original production, whereas a water reservoir has sufficient compressibility or elasticity to take large quantities of gas and return it through production wells without loss of volume.

Early failures in using water reservoirs do not condemn this type of storage, he said, as they can be explained by the fact that in some of them the formations were fractured and permitted extensive leakage, while in others the gas was withdrawn so fast or from such a narrow band of the sand that coning developed and the wells produced water.

**Study needed.**—Gardescue said that proper study of the reservoir formation, proper location and completion of input and withdrawal wells, and continual check on the gas-water contact will prevent failures such as those encountered with early experiments and will make water reservoirs satisfactory and economical underground storage.

**Officers.**—New officers elected by the association were: President, Paul Kayser, El Paso Natural Gas Co., Houston; First Vice President, J. F. Merriam, president of Northern Natural Gas Co., Omaha; Second Vice President, S. B. Irelan, president of Cities Service Gas Co., Oklahoma City; and Treasurer, F. W. Peters, Oklahoma Natural Gas Co., Tulsa.

# Pumping-Problem Study

## Electronic analyzer seen as valuable aid in predicting pumping performances, A.S.M.E. group told

**Joseph A. Kornfeld**

THE electronic brain offers excellent possibilities for analysis of the complex problems of sucker-rod pumping, Emory N. Kemler, University of Minnesota, Minneapolis, told the American Society of Mechanical Engineers here.

Kemler, professor of mechanical engineering, and a researcher in sucker-rod-load problems for the past 15 years, addressed 200 members of the petroleum division at the opening session of their annual conference.

The technologist described preliminary results of an electronic analyzer which he constructed at University of Minnesota in which resistances, induction coils, and capacitors were arranged in an electrical network attached to an oscillator; the arrangement comprised an electrical analogy of the variables encountered in sucker-rod pumping. For example, valve action, the most complex feature of the system, was simulated by low-resistance germanian rectifiers.

**Factors analyzed.**—Kemler cited the basic factors involved in sucker-rod pumping, including the static effect of lifting of a weight, the elastic effect of rod stretch which causes a phase shift in the system, mass effects of inertia, frictional effects, and valve action which results in a discontinuous system.

Valve action in a sucker-rod pumping system operates to make the system itself variable over the pumping cycle. Thus, on the downstroke of the polished rod, the system is essentially that of the sucker-rod string alone. On the upstroke of the polished rod, however, the system becomes that of the sucker-rod string plus the fluid column. This highly complex feature of the pumping cycle makes a complete mathematical analysis impractical. However the use of electrical models which permit the use of rectifier tubes as valves is one approach to the solution of specific pumping problems.

In the early days of sucker-rod pumping, when wells were shallow and the pumping cycle very slow, maximum load could be approximated by adding the rod load to the fluid load with a small allowance for friction; the dynamic loads were small and the elastic effects were relatively unimportant. However, as wells became deeper, these various effects became more important and in many cases their influence greater than the static loads involved.

**Complexities cited.**—These effects entered in the problem in a very complex way. If the maximum load is caused by the dynamic effects, it would occur when the polished-rod acceleration was at a maximum. This would mean that the maximum load would occur at the start of the upstroke. The maximum load occurs near the middle of the stroke for normal and even moderately high pumping speeds, which shows that other factors are more important in the determination of the maximum load than the acceleration factors.

Under conditions of high operating speeds, such as were employed in taking potentials in western Kansas back in 1937, the maximum load occurred at the start of the upstroke and resulted from the acceleration forces. Peak torque conditions occurred near the midstroke.

**Role of friction.**—Sucker-rod friction was described by the speaker as being more dependent upon hole straightness than on any other factor. Little information is available on the variation of rod friction with hole conditions or the pumping cycle.

Kemler explained that the vibrations in the fluid column might cause

*A.S.M.E. CHIEF WELCOMED.—J. Calvin Brown, Los Angeles, right, president of A.S.M.E., is greeted at Tulsa airport by Francis J. Daasch, chairman of local arrangemens committee.*

more trouble than vibrations in the sucker-rod string itself. Another effect was the extra energy resulting from expansion of solution gas.

Douglas O. Johnson, Johnson-Fagg Engineering Co., Tulsa, who participated in the discussion, thought that frequency of the fluid column should be taken into consideration in sucker-rod-pumping-system studies. L. W. Fagg, of the same firm, analyzed that factors needed in dynamic studies were the amount of plunger travel and the working fluid level.

J. C. Slonneger, Continental Supply Co., Dallas, stated that the two disturbing factors in sucker-rod pumping systems were the sine curve arising from the walking-beam motion and the loading and unloading of sucker rods.

The convention, September 24 to 26, included 16 symposia on the topics of pumping equipment, liquid measurement, pilot plants, drilling, corrosion, offshore drilling, instrumentation, and equipment selection. In the field of pipe-line technology, groups were devoted to engines, pipeline control, corrosion, and a panel on welding practices and experiences with high-yield-point pipe.

Joseph M. Sexton, M. W. Kellogg Co., Jersey City, N. J., is chairman of the executive committee of the petroleum division; other members are B. B. Morton, International Nickel Co., New York, secretary; A. C. Stutson, Socony-Vacuum Oil Co., Inc., New York, F. H. Warren, Ohio Oil Co., Findlay, and Kemler. Robert G. Critz, is chairman of the Mid-Continent section; R. P. Lennart, vice chairman, B. E. Forney, secretary, and Carl A. Stevens, treasurer.

# Process Pilot Plants

## Their contribution to many advances in modern refining technology are related at Tulsa A.S.M.E. meeting

**John C. Reidel**

THE petroleum industry has had a leading role in development of continuous-process pilot plants, and these in turn have contributed in no small measure to advances in refining technology, J. B. Rearick, of M. W. Kellogg Co., told members of the American Society of Mechanical Engineers in Tulsa.

Rearick's paper, "Short Cuts in Pilot Plant Engineering," was one of three discussing the art of pilot-plant design and construction.

One use of pilot plants is to obtain data on a new process that might be projected for design of commercial units, and for this reason they might be termed "units of the future." Pilot plants, on larger scale (in the 4 to 10-bbl. per day capacity range) may also be utilized: (1) to bridge the gap between the bench-scale and commercial equipment; (2) to study relationship of variables involved in a process; and (3) to obtain data on an existing process that would be useful in construction of a new plant employing that process. Since results obtained with the pilot plant must represent performance from a full-scale unit adequate process and mechanical engineering must go into its design and construction. Process design must reconcile the fact that a commercial plant is set up for more specific conditions than the pilot plant. The latter is built for as wide range of conditions as possible.

**Dollars and cents.**—To keep pilot-plant engineering costs down to a minimum, Rearick stated, his company operates on the principles of continuity, coordination, and standardization. One individual is assigned to a given project to follow it from initial design stages to completion of construction. Close coordination between design, mechanical, and machine and instrument groups is essential. Adequacy of mechanical design is a most important factor and one which may spell the difference between success and failure of a pilot project. Finally, with the dollars and cents picture in mind, standardization is resorted to whenever possible.

**Smaller equipment.**—Design of bench-scale units was dealt with in a paper by B. M. Wedner, W. A. Horne, and T. P. Joyce, of Gulf Research & Development Co. These units are primarily intended for exploratory research to investigate new ideas, it was stated. However, they also serve as a first step toward the design of the larger-scale-development pilot plant. Essential elements of the bench-scale system are: feed system, reactor assembly, and recovery system. Two types of furnaces are ordinarily used by Gulf laboratories for heating reactors. For study of endothermic or exothermic reactions the furnace most generally employed is stainless steel tubing wound with multiple heaters. The other type of furnace is an electrically heated heavy walled aluminum bronze casting machined to fit the reactor.

**Pressure vessels.**—These are designed in accordance with A.S.M.E. code for unfired pressure vessels except in those cases where extremely heavy wall is required due to extreme conditions of temperature and pressure. In these cases design is based on the yield strength of the material and greater precautions in design, fabrication, and testing are taken. With regard to closures Gulf uses the compression and the Bridgeman, or plug type. From Gulf experience the plug type seems to be more advantageous at pressures above 5,000 psi. and at working temperatures approaching 1,000° F. Selection of materials is based on conditions (high temperature, high pressure, and corrosive products) encountered in hydrogenation processes. Stainless steel, Type 347, and 18-8 columbium stabilized stainless steel has been meeting these conditions best. With type 347 stainless procurement becoming more difficult substitute materials are under consideration for reactors and preheaters.

"A Small Scale Plant for Studying Catalytic Reactions at High Pressures and Temperatures," by C. M. Sliepcevich and G. G. Brown of University of Michigan reviewed experience obtained in building a small-scale pilot plant, for study of catalytic reactions, which has operated successfully at pressures as high as 10,000 psi. and temperatures as high as 1,200° F. Particular attention was paid to the design of reactor closures for this project.

## SOUTHWEST

# Gas Flaring Hit

### Texas commission denounces increase in fuel's waste; October daily crude allowable set at 3,115,512 bbl.

AUSTIN.—Flaring of natural gas is still a deep concern of the Texas Railroad Commission, and indications are that steps will be taken shortly to further curtail this practice.

Olin Culberson, chairman, before the state-wide allowable hearing here last week cited the terrific increase in amount of gas flared between January and July 1951, and stated that "the commission is of the opinion that steps should be taken to alleviate the waste which is now taking place" in the various fields.

Culberson said this could be accomplished by a "restriction in the gas-oil ratio rule or by reducing the number of producing days, which will limit the gas being produced with the oil to the capacity of the plant and the capacity of the transmission line that takes the gas from these fields."

Wasting of natural gas or wet gas in the field, Culberson stated, is, in the opinion of the commission, "just as wasteful as the production of a barrel of oil at surface and then dumping that barrel of oil into the creek."

The commissioner indicated that this subject would receive further attention when the next state-wide proration hearing is held in Beaumont October 9.

During last week's hearing, the commission set the daily crude-oil allowable at 3,115,512 bbl. for October, with 25 general producing days over the state, excepting East Texas, which was allowed 19 producing days, and Picton field of Hopkins County in District 5, put on an emergency 10-day producing order due to increased drop in reservoir pressure.

**Gas waste.**—Culberson stated that during January 1947 Texas produced 60,199,538 bbl. of oil, and vented gas totaling 5,946,000,000 cu. ft. During January 1948 73,010,340 bbl. of crude was produced, and gas flared totaled 6,743,000,000 cu. ft. In January 1949 72,273,992 bbl. of oil was produced and 6,226,000,000 cu. ft. of gas was flared. In January 1950 59,699,664 bbl. was produced and 2,332,000,000 cu. ft. of gas flared, and in January this year 78,163,185 bbl. of oil was produced, with operators flaring 2,320,000,000 cu. ft.

"During the month of July 1951," he said, "Texas produced 84,889,438 bbl. of crude oil, and total gas reported as flared was 5,500,000,000 cu. ft.

"It is interesting to point out that between January 1951 and July 1951, the oil produced increased 8.61 per cent, while at the same time the volume of gas reported as flared in January of 1951 and during the month of July 1951 increased almost 137 per cent."

**West Texas cited.**—The commissioner said that the greatest increase in volume of gas being flared at gasoline plants was in District 8 (West Texas). Reports submitted to the commission, he said, as an example showed that in the Waddell plant of Crane County, the volume of gas being flared during June 1951 was 152,104,000 cu. ft., while in July the volume of gas being flared increased to 198,765,000 cu. ft.

Culberson pointed out that the Goldsmith plant in Ector County flared 870,002,000 cu. ft. in June, but increased the total to 1,135,398,000 cu. ft. in July; the Keystone plant in Winkler County flared 185,517,000 cu. ft. in June, and 200,133,000 cu. ft. in July; and in the Kelly-Snyder area, the Snyder plant in Scurry County flared 104,555,000 cu. ft. in June, and 326,977,000 cu. ft. in July.

"Total number of wells connected to the above gasoline plants," Culberson reported, "increased from 5,289 to 5,872, or a total increase of 583 wells, while at the same time, the allowable was increased in those fields from 256,378 bbl. to 345,551 bbl., or an increase of 89,173 bbl. per day."

**Operators explain.**—Carl Jones, Phillips Petroleum Co., said that the Goldsmith plant is flaring 11,445,000 cu. ft. of wet gas daily and 21,254,000 cu. ft. of dry gas. By October 1, he said, the company expects to eliminate flaring of wet gas and that El Paso Natural Gas Co. plans to complete a pipe line to handle the dry gas by November.

K. C. Howard, speaking for Richardson & Bass, said that the situation at Keystone has been corrected since the commission's report had been prepared. Spokesmen for the Waddell plant operators said that the wet-gas flaring will cease about October 1 and that it is believed El Paso can handle most of the residue.

**Record set.**—The state-wide oil-proration order for October, setting the calendar-day allowable at 3,115,512 bbl., makes October the third straight month that the former all-time Texas allowable record has been broken and the sixth straight month that the allowable has been set above the September 1950 record high of 2,886,458 bbl.

In general, the commission responded to pleas from defense officials and Petroleum Administration for Defense spokesmen in maintaining a high level of production even during the summer months. At various times company officials have been critical of the high-production rate, but at the hearing representatives of all major companies present approved of the order.

The October allowable is 395,512 bbl. above the Bureau of Mines demand forecast of 2,720,000 bbl., which was 30,000 bbl. more than its forecast for September. Purchaser nominations for October totaled 3,071,172 bbl., an increase of 32,249 bbl.

**TEXAS ALLOWABLES**

| District— | Sept. 15 | Oct. 1 |
|---|---|---|
| 1. Southwest Texas | 38,579 | 38,683 |
| 2. Southwest Texas | 177,874 | 179,202 |
| 3. Gulf Coast | 525,542 | 528,478 |
| 4. Southwest Texas | 284,878 | 286,655 |
| 5. East Texas | 61,830 | 57,564 |
| 6. East Texas—Outside | 125,713 | 126,559 |
| 7. East Texas field | 280,948 | 272,390 |
| 7-B. West Central | 109,692 | 110,232 |
| 7-C. West Central | 123,991 | 124,761 |
| 8. West Texas | 1,072,276 | 1,081,467 |
| 9. North Texas | 205,042 | 205,913 |
| 10. Panhandle | 103,606 | 103,608 |
| Totals | 3,109,971 | 3,115,512 |

## EASTERN

# Waste Makes Oil

### Water-disposal "backfire" lifts reservoir pressure

MOUNT PLEASANT, Mich.—Modern reservoir-control techniques utilize return of water to an oil-producing stratum to increase oil recovery and to maintain reservoir pressure. In Pentwater oil field on the shores of Lake Michigan, an independent operator did the opposite one summer day about 3 years ago. Un-

*Map showing location of Pentwater field.*

knowingly, he started pressure maintenance with water in a shallow oil pay fully 3 months before any oil was produced from that particular formation.

**How it happened.**—Shortly after Pentwater field was discovered in July 1948, producing from Dundee dolomite found at 2,000 ft., a real field problem arose how to dispose of excess water produced from the wells.

Faced with the need for finding a well suitable for water disposal, Roosevelt Oil Co. converted a dry hole drilled at the northeast offset to the field discovery well. Pipe was set on top of an upper formation which was not then producing oil in the field. This was the Lower Traverse, a vugular, coralline dolomite of Devonian age which lay at a depth of 1,600 ft., about 400 ft. above the Dundee main pay.

**Surprise.**—Surplus water from the Dundee was returned to this saltwater disposal well during August 1948. Meanwhile, field development of the Dundee zone proceeded fast. That fall, Gulf Oil Corp. tested the upper formation while drilling wells originally projected to the Dundee, and drill-stem tests were favorable. On November 9, 1948, an oil well was brought in from the Traverse zone. Development proceeded in the upper formation until there are 26 oil wells completed from this zone today.

Meanwhile, greater and greater volumes of water were being returned to the disposal well situated northwest of Traverse zone oil wells. As bottom-hole pressure surveys were conducted in the Lower Traverse formation from time to time, reservoir engineers observed the effect of return of water on improvement in reservoir efficiency. Encouraged, they converted three other wells to water injection.

**Success.**—Last month, Carter Oil Co. engineers compared results of their annual bottom-hole pressure survey with that conducted 14 months ago to observe how pressure maintenance was progressing in the Lower Traverse zone. Instead of flattening off, reservoir pressure built up 9 psi.

During the period between the May 1950 and the August 1951 surveys, 703,000 bbl. of oil and 1,100,000 bbl. of water were withdrawn from the Lower Traverse reservoir.

A total of 2,250,000 bbl. of water was returned to the four injection wells during the period. Weighted average reservoir pressure of 650 psi. observed in May 1950 rose to 659 psi. by August 9, 1951.

Today, the Lower Traverse wells produce 930 bbl. of oil per day. Total productive acreage is 520 acres; a uniform spacing pattern of 20 acres per well has been employed. Carter owns the lion's share of the reservoir with 24 wells while Gulf Oil Corp. owns the remaining 2 oil wells in this zone.

## GULF COAST

# Tidelands Accord Seen

### Legislation for interim management pending final O.K. by Congress appears closer by determination to compromise

WASHINGTON. — Legislation providing an interim arrangement for management of the tidelands pending final action by Congress has been brought considerably closer to enactment as a result of a determination to compromise the differences which have kept it bottled up in the Senate interior affairs committee for months.

Sen. Joseph C. O'Mahoney of Wyoming, chairman of the committee and author of a resolution providing for interim federal management, is now willing to make concessions but will not go so far as the House-approved quitclaim bill. Sen. Russell Long of Louisiana, who proposed amendments to O'Mahoney's resolution which would give administration to the states, also is willing to compromise.

If a compromise measure can be passed quickly by the Senate as a substitute for the Walter bill passed by the House, the matter could be sent to conference and, in view of indications that Congress will adjourn nearer October 20 than the October 1 date aimed at, final action might be possible this year.

**O'Mahoney willing.**—O'Mahoney explained his willingness to compromise as due to the situation created by the cutting off of Iranian oil which made highly desirable a resumption of activities on the submerged lands. Long explained he wants at least to permit operations on leases the states already have issued and put to work millions of dollars worth of equipment which has been idled by the controversy.

The Wyoming senator made it plain he would not consider any legislation in which the federal Government relinquished claims to land beneath the open sea beyond the seaward boundaries of the states—3 miles in the case of California and Louisiana and 10½ miles in the case of Texas, but indicated a willingness to compromise on the area within the state boundaries to the extent of giving the states authority to manage it subject to federal control which would preserve the sovereignty awarded the United States by the Supreme Court.

**Revenue.**—It is also expected the legislation will provide that the states' share of revenues from the areas within their seaward boundaries shall be made immediately available, rather than being put in escrow to await the enactment of permanent legislation. Provision may be made, too, for a division between the states and the federal Government of the revenues from the area beyond the state boundaries. The big fight over the proposal of Sen. Lister Hill of Alabama to set aside all offshore revenue for aid to education may be settled by letting the states use their share as they wish and putting the federal portion to that use.

It is now generally accepted in Congress that the Walter bill could not be enacted over a presidential veto, and O'Mahoney contends it could not be passed in the Senate. This situation is due in large part to a rift in the coalition which made passage of the bill possible in the House, the result of the failure of southern members to support their northern collaborators on the question of housing.

**Production data.**—Data submitted to the Senate committee by the Geological Survey shows that 111 wells were drilled or undertaken inside the 3-mile limit off the coast of Louisiana and 120 outside the 3-mile limit. Of the 111 wells, 69 are now producing oil, 1 is producing gas, 1 is a shut-in oil well, 3 are shut-in gas wells, 34 were dry holes, and 3 are now being drilled. Outside the state boundary, 24 wells are producing oil, 4 are producing gas, 6 are shut-in oil wells, 23 are shut-in gas wells, 69 are dry holes and 2 are now being drilled.

Off the Texas coast, seven wells were drilled or undertaken inside the state limit and seven outside. Of the first group, three are producing oil, one is a shut-in gas well, and three were dry holes. Outside the limit, one is a shut-in gas well, six were dry holes. The survey's figures were as of July 31.

## Sunray to Build Refinery

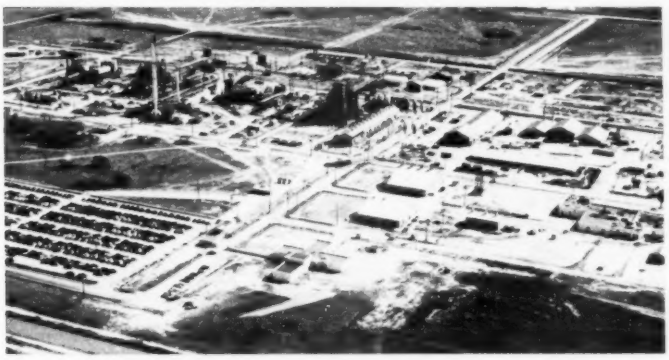
CORPUS CHRISTI.—A new 25,000-bbl. refinery will be built at Corpus Christi by Sunray Oil Corp., F. L. Martin, vice president of refining, announced here following approval of the construction certificate by the Defense Production Administration in Washington.

Estimated to cost in excess of $10,000,000, including additional tankage and a pipe line to Sunray's dock and barge facilities here, the refinery will be built as soon as engineering details can be worked out. No definite

starting date for construction was disclosed.

The refinery will be built in conjunction with Sunray's present deep-water crude-oil-terminal facilities and tank storage of 1,330,000 bbl. at Corpus Christi and vicinity, and Sunray Coastal Pipe Line Co.'s crude-oil gathering system from Placedo to Corpus Christi. The pipe-line facilities will be capable of delivering 20,000 bbl. daily into the refinery, and an additional 10,000 bbl. is available from Sunray-owned or controlled production which can be delivered into the plant through facilities of other Texas crude carriers.

The refinery will be integrated and of the latest design, and will produce as a principal product highest-grade aviation-type gasoline. Components will consist of a U.O.P. fluid catalytic cracking unit, hydrofloric acid alkylation unit, thermal cracker, gas-concentration unit, phosphoric acid, polymerization unit, and complete utilities, crude, and vacuum unit, and Petreco desalters.



*NO PLACE FOR WASTE.—This du Pont petrochemical plant on the Gulf Coast will dispose of its chemical wastes by injection into underground brine formations, borrowing the technique used in disposal of oil-field wastes.*

# Down the "Drain"

## Du Pont to try underground disposal of chemical wastes from its petrochemicals plant near Victoria, Tex.

**F. Lawrence Resen**

VICTORIA, Tex.—Underground disposal of salt water is old stuff in oil fields, but du Pont engineers are investing almost half a million dollars to see if the same method will take care of chemical wastes from the company's petrochemical plant near this Gulf Coast city.

The gamble lies in the fact that the plant wastes, unlike oil-field wastes, are not the same liquids as naturally occur in the underground formations. The plant makes intermediates for nylon and the wastes are aqueous solutions containing various chemicals, and until the project is completed it will not be known whether or not the sands will take large injections of such wastes.

Geologists contended that tests with samples of sand and brine from wells in other localities would not give positive results, so du Pont had to drill a well at the site to get samples for experimenting.

**Injection well.**—The disposal well at the plant site was drilled to a total depth of 4,822 ft., and cored extensively in a search for brine sands. Between 3,750 and 4,600 ft. the engineers found 400 to 500 ft. of unconsolidated sands which appeared capable of receiving wastes.

The well was completed with a surface string of $10^{3}/_{4}$-in. casing cemented at 1,987 ft., and a string of 7-in. casing from surface to total depth and cemented from 1,987 ft. to bottom. This casing will be perforated at the levels selected for injection.

The waste will be injected through a string of about 4,800 ft. of $3^{1}/_{2}$-in. aluminum-bronze tubing.

**Disposal equipment.**—The surface equipment will be similar to that used for disposal of salt water in East Texas field. A brine treatment plant will precipitate metal hydroxides, settle out solids, adjust the pH factor, chlorinate the waste, and filter it. The treated waste will be injected into the well by a triplex positive-displacement pump with a capacity of 9,000 gal. per hour.

To prevent corrosion, aluminum-bronze metal was used for the tubing string and certain packer parts, and both strings of casing were coated with Tube-Kote. Otherwise the system is similar to those commonly used for underground disposal of oil-field brines.

The disposal system will be put in operation late this year, and if it is successful a second well will be drilled to take care of waste from additions to the plant now under construction.

**Significance.**—Disposal of plant wastes without polluting streams is a serious industrial problem, and the du Pont company alone is currently spending about $3,500,000 per year in preventing pollution. Success of the Victoria well could lead to the use of underground disposal of various kinds of liquid wastes in many localities.

# Gasoline Rationing?

## Brown says steel holds key to future supplies

JENNINGS, La.—Unless the oil industry can be supplied with the steel it needs to drill sufficient wells and expand refining capacity, it is only a question of time before the people of the United States will again be faced with rationing of gasoline and home-heating oils.

Bruce K. Brown, deputy petroleum administrator, implied this in a special address here in commemoration of the fiftieth-year anniversary of discovery of Jennings oil field, but indicated that this is not the case as far as the immediate future is concerned.

He told the Louisiana Golden Oil Jubilee attendants that it is only a question of time "before there will be a new wave of protests from automo-

*SPEAKS AT JENNINGS.—Bruce K. Brown, deputy petroleum administrator, addressing celebrants at the Louisiana Golden Oil Jubilee in Jennings, La.*

bile owners and home owners heating with oil.

"That conclusion," he said, "is not a happy one with all its implications of rationing, but it is inescapable. If we do not get the materials, we are not going to be able to keep up the expansion of the industry that the Petroleum Administration for Defense has programed.

"And if we do not get the expansion, the industry is going to fall increasingly far behind a demand for petroleum that increases by the day."

The celebration was somewhat dampened by rain, which forced Brown to cut short his speech, but copies were distributed to those attending.

**Jennings praised.**—Brown praised the discovery of Jennings field, and said that it still ranks, from the standpoint of oil actually lifted to the earth's surface, as the eightieth largest field ever discovered in the United States.

"Even now new wells are being drilled around this first salt-dome structure discovered in Louisiana, and it is estimated that the field still retains some 20 per cent of its producible reserves. That is a remarkable record for an area from which more than 4 per cent of all the oil actually produced in the State of Louisiana has been lifted."

"Since the first quarter of 1951 we have been rocking along with a supply of steel just about 75 per cent of the amount that the oil and gas industry was using in the months just before the Korean invasion," he said. "Unless the situation is bettered, and soon, we are in for trouble."

## Texas Gas Exports Opposed

CORPUS CHRISTI.—Olin Culberson, chairman of the Texas Railroad Commission, told the Corpus Christi Geological Society that he is completely opposed to the exporting of any more natural gas from Texas.

Culberson, stating that he had always been opposed to the export of natural gas, charged that pipe lines are taking gas out of the state at such a rate that the supply may be exhausted before the 20-year amortization on pipe lines runs out. Such a happening, he said, could wreck Texas economy.

He felt that Texans were willing to share what gas they had left, but he didn't feel inclined to supply people who still have 2,000 years of coal left, meaning the eastern states. Coal is as vital for their economy as oil and gas are here, he said, and there is no reason to send gas to the eastern states just because coal fields have labor troubles.

# NATIONAL AFFAIRS

# Steel Plan May Change

### PAD considers revision of tubular-goods distribution plan as suggested by trade-association representatives

**Bertram F. Linz**

WASHINGTON.—A number of specific suggestions for revision of the oil-country tubular-goods distribution program are before the Petroleum Administration for Defense as a result of a meeting with representatives of 14 trade organizations early this month.

That meeting developed that there are three major complaints about the present procedure: (1) the 1950 historical basis for allocations is inequitable in cases where that year is not representative; (2) some of the smaller operators are finding it difficult to secure pipe because of their inability to estimate their requirements accurately; (3) the mills are not producing pipe entirely in accord with the industry's current size and weight requirements.

To meet these objections, PAD is expected to modify its procedure so that where the use of 1950 as a base is inequitable a producer may be given an alternative based on a more representative period.

**Increased stocks wanted.**—It was also suggested that field stocks be doubled so that in addition to the 5 per cent now set aside for wildcat requirements 5 per cent will be available for small producers who normally buy out of stock. This would necessitate a new procedure under which producers who drill 11 or fewer wells a year would continue to schedule their quarterly requirements as at present, but would secure pipe under their allocations from field stocks.

PAD already is making efforts to increase production of pipe in smaller and lighter sizes which some operators complain they have been unable to get with the result there is an inefficient use of steel because they have to use heavier pipe than a well requires.

**Imported pipe.**—Considerable opposition has been expressed to a suggestion that imported pipe be charged against inventories and allocations. Heretofore, operators have been encouraged to buy imported pipe as a means of stretching the domestic supply and such pipe has not been counted against them.

It is feared that any change would tend to discourage imports and might have serious effects in view of the fact that the total tonnage of tubular goods for domestic operations is estimated to be 5 to 10 per cent below the amount required to drill at the rate of 43,400 wells a year.

**Scrap important.**—Meanwhile it was announced by defense-agency officials that unless a steady supply of 3,000,000 tons a month of scrap can be developed the steel industry is not going to reach its target of 118,000,000 tons production next year and the oil and many other industries will face serious curtailment of their steel allocations.

The officials, who have been calling for intensified scrap collection over a period of months, now assert the shortage has reached emergency proportions.

# Oil Imports Fight

### Petroleum, coal producers will resist any increases

WASHINGTON. — Modification of existing oil-import requirements will be opposed before the Tariff Commission and committee for reciprocity information next month by domestic independent producers and spokesmen for the coal industry.

Spokesmen for the oil and coal producers will resist any further reduction in the import excise tax at hearings to start before the Tariff Commission October 2 to determine the "peril point" below which the tax on petroleum and duties on iron ore and metal cannot be reduced without imperiling domestic industry. Oil and iron are the only commodities listed so far by the State Department as the possible bases of concessions in the negotiation of a new reciprocal trade agreement with Venezuela.

A week later, the committee will open hearings designed to develop the views of domestic producers, importers, and exporters on the advisability of making concessions, at which it is expected retention of the present quota system will be urged by both the oil and coal producers.

**Iran question.**—Basis of the oil producers' opposition to any further tinkering with the import requirements is a fear that if Iran comes back into the world oil picture a substantial surplus of foreign oil may develop and might be dumped on the United States. They point out that since the Iranian fields were shut down other Middle East production has been increased by more than 500,000 bbl. daily.

Imposition of both the import tax and the quota system was the result of years of pressure by the domestic

# WATCHING WASHINGTON

**Bertram F. Linz**

## Sulfur Poses Problem

A critical shortage of sulfur through the final quarter of this year is seen as forcing the National Production Authority either to curtail its use by 15 per cent or cut consumer inventories from a 3-month to a 25-day supply.

Either course could produce about the 100,000 tons of sulfur required to make up the deficiency between the estimated production during the quarter of 1,338,500 tons and the anticipated demand of 1,438,500 tons.

NPA officials lean toward the inventory cut because any heavy reduction in the permitted rate of consumption would create hardships throughout a wide range of important industries and tend to reduce production for defense at a time when increasing output is needed.

As a move to encourage maximum recovery and production of sulfur by industries which use it, NPA is considering a plan to permit such companies to use a large proportion of the sulfur so secured, in addition to their regular allotment. Currently, sulfur users are restricted to 100 per cent of the amount used in 1950.

An order now under consideration would permit a company to use the new sulfur it produces up to 50 per cent of its permitted rate. Thus, if a company is now permitted to use 100,000 tons a year and installs facilities for the recovery of sulfur from new sources, it could use up to 50,000 tons of its own production, or a total of 150,000 tons.

Although the long-range outlook on sulfur is better, there is little likelihood that the present situation will improve for some months. Some increased production will come in next year and in 1953 a recently discovered deposit on the Gulf Coast will go into production with a possible output of 500,000 tons a year.

## OPS Lowers the Boom

Oil men reading official releases from the Office of Price Stabilization should remember that often there is more behind the words of a bureaucrat's statement than the facts to which they refer.

Specifically, smarting under insinuations that the $3,126,811 fund they have asked from Congress for publicity is to be used to set up a propaganda mill which will come in handy in the 1952 presidential campaign, OPS officials have lowered the boom on the use of certain terms which may have, as they expressed it, "objectionable connotations among persons critical to OPS."

In an instruction sheet labeled "Copy Problem No. 7," OPS writers have been told they should avoid the use of the word "control," substituting such terms as "stabilization," "price program," and "efforts to hold prices down."

"Defense spending" is also to be foresworn in favor of "defense production." Positive statements that OPS has stopped or can stop inflation are out, and the term "lull in prices" is not to be referred to as an accomplished fact and "references to the 'lull' should be followed up by statements that show an awareness of the pressures ahead."

Bearing this word juggling in mind, the average reader should have no difficulty in discerning that OPS releases on oil and gas mean "no increase in prices."

## Industry Dispersal

Top defense and military officials have assured the oil and other industries that the new industrial-disperal policy will not be conducted in such a way as to interfere with securing the highest possible production of petroleum products and other needs of the mobilization program.

The dispersion plan was developed by the National Security Resources Board but it will be administered by the Defense Production Administration under the over-all direction of Defense Mobilizer Charles E. Wilson. Wilson has stated flatly that if the policy hinders production, it will be changed.

Industrial leaders from all sections of the country recently were called to Washington by the NSRB to be informed regarding the plan. They were given details of its purpose and operation by Wilson, Defense Production Administrator Manly Fleischmann, Munitions Board Chairman John D. Small, and NSRB experts.

Only a relatively small part of industry will be involved in the dispersal program. Established industry will in no way be affected, nor even all new plants which will receive such incentives as quick tax write-offs, allocation of critical construction materials, defense contracts, and emergency loans.

producers. The tax was reduced in the 1939 trade agreement with Venezuela, at which time the quota system was introduced only to be suspended in the making of an agreement with Mexico in 1942 on the ground of the wartime need for oil.

The quotas were reimposed this year as a result of the abrogation of the Mexican agreement, much to the dissatisfaction of Venezuela which will seek their elimination, with or without any further reduction in tax, in the negotiation of a new agreement.

**Coal sides with oil.**—The coal industry has been on the oil producers' side because of its loss of utility and other markets on the East Coast to imported oil.

In line with their opposition to uncontrolled imports, the independent producers, through the Independent Petroleum Association of America, are seeking permission to intervene in the application of the Montana Power Co. to the Federal Power Commission for authority to import natural gas from Canada.

Emphasizing that it is not opposed to imports of oil and gas designed only to supplement but not supplant domestic supplies, the association points out that, as a public utility, the power company has a monopoly in its area and if it is permitted to import gas domestic producers, no matter how much gas they might be able to supply, would be foreclosed from the opportunity to sell it.

## More NPA Orders Issued

WASHINGTON.—The following orders have been issued by the National Production Authority:

**Direction 3 to CMP Reg. 1,** Sept. 17: Authorizing manufacturers to order up to 40 per cent of their quarterly allotments of steel, copper, and aluminum for delivery in any month in the quarter.

**Amendment to M-8,** Sept. 21: Extending third-quarter limitations on the use of pig tin to succeeding quarters.

**Amendment to M-57,** Sept. 11: Regulating the use of quebracho in the drilling of oil and gas wells.

**Amendment to M-66,** Sept. 11: Eliminating inventory limitations on artificial graphite and carbon electrodes.

**Amendment to M-22,** Sept. 11: Controlling the movement of aluminum scrap.

**Amendment to M-68,** Sept. 11: Limiting the use of automatic transmissions in passenger automobiles effective Oct. 1.

**Amendment to Reg. 2 and CMP Reg. 3,** Sept. 13: Establishing a superiority for materials for top-urgency defense programs.

# Navy Changes Mind

## Continued search for oil in Alaska planned next year if Congress approves appropriation; opposition voiced

WASHINGTON.—The Navy Department has decided to go ahead with its exploration for oil in Alaska and will ask Congress next January for $5,000,000 with which to continue the work in Naval Petroleum Reserve No. 4.

Determination to reverse an earlier decision to close the project down at the end of this year because of the pressure of the defense program on materials was a result of a visit to Alaska this summer by the assistant secretary of the Navy.

So far the program has cost close to $50,000,000, with which 57 wells has been drilled. On the basis of five wells drilled in the Umiat structure estimates of the oil discovered range from 2,000,000 to 151,000,000 bbl. and average at about 70,000,000 bbl. making the cost of discovery alone about 70 cents per barrel.

The decision to go ahead with the project did not receive the unanimous support of all members of the Office of Naval Petroleum Reserves. Testifying recently before a Senate appropriations subcommittee whose chairman, Sen. Joseph C. O'Mahoney of Wyoming, asked him directly what he thought about it, Col. Ottmar F. Kotick, deputy director of naval petroleum reserves, frankly expressed his disapproval.

"I know how critical steel is in this country," Kotick said. "I know how people are anxious to drill wells. Although our steel use up there in NPR 4 is only about 1,000 tons a year, yet 1,000 tons a year is a lot to the man that cannot get any.

"From a timing basis my personal opinion is it will be a considerable period of time before we can find and develop and transport the oil out of there.

"Under the present circumstances, I would postpone it."

**"Just a start."**—Kotick, who had 15 years' experience as a petroleum geologist before entering the Army in 1941, told O'Mahoney that the 70 cents per barrel cost so far involved is "just a start" to what will have to be spent to drill the wells and pipe line to get the Alaskan oil out.

However, he pointed out, total expenditures by the Navy in all its petroleum reserves, including Alaska, have so far been $30,000,000 less than the revenues from the oil so that further development in NPR No. 4 will not come out of the taxpayers' pockets.

The exploration program is being carried on by Arctic Contractors, a civilian organization working on a cost-plus-fixed-fee contract. Annually, the department and the contractors confer on the fee for the current fiscal year, based upon estimated expenditures. Up to June 1, the contractors received $1,557,546, an average of 3.7 per cent on total funds allotted.

## Gas Restrictions Explained

WASHINGTON. — Restrictions on extension of natural gas service do not limit deliveries of gas for use as a raw material in a chemical process or as a source of the heavier hydrocarbons.

This point is made clear by the Petroleum Administration for Defense in answers to 22 most frequently asked questions regarding the operation of PAD Order No. 2.

PAD's interpretations also make the point that the substitution of state for federal controls as provided for in the recently amended Defense Production Act does not relieve natural-gas sellers from the reporting provisions of the order. So far, the states of Maryland, New Hampshire, Ohio, Virginia, West Virginia, and Wisconsin have issued their own restrictions, nullifying those in the PAD order.

## Warne May Get FPC Post

WASHINGTON.—William E. Warne, assistant secretary of the Interior, is seen in Washington as likely to succeed Mon C. Wallgren as a member of the Federal Power Commission when the latter carries out his long-announced intention to resign.

Warne is backed by Interior Secretary Oscar L. Chapman, who reportedly is anxious to have a "public power" man on the commission, and is said himself to be highly receptive to the idea. The change on the FPC is only one of a number expected to occur before the end of the year.

James Boyd, director of the Bureau of Mines who recently was removed as head of the Defense Minerals Administration, reportedly because of an interdepartmental row over Chapman's plan to encourage construction of a coal-hydrogenation plant to produce synthetic-liquid fuels, is authoritatively said to have resigned. Reportedly, however, Dr. W. C. Schroeder, formerly director of the synthetic-liquid-fuels division, who was appointed assistant director of the bureau simultaneously with Boyd's removal as head of DMA, will not succeed him as director. Retirement of Eric Johnston as economic stabilization administrator is expected late in October or early in November, with no successor in sight so far. Toward the end of the year, Johnston will be followed out by Price Stabilization Director Michael V. DiSalle, again with no likely candidate for his job in the picture.

A new head for the National Production Authority also is expected to be needed in the near future. Manly Fleischmann, who currently heads both that agency and the Defense Production Administration, is reported anxious to be relieved of some of his responsibilities and will concentrate on DPA.

# Certificates Issued

## Accelerated amortization O.K.'d for 136 oil projects

WASHINGTON. — Certificates of necessity for accelerated amortization of $469,695,000 of a $621,969,000 investment in facilities for the production of gasoline, fuel oils, and lubricants were issued by the Government up to August 18, when a general 60-day moratorium on the granting of certificates went into effect.

A number of additional certificates, however, have been issued since August 18 for petroleum products and sulfur under special exceptions from the general suspension which would increase the total by more than $85,000,000.

A tabulation of 3,328 certificates outstanding when the moratorium was imposed, by the Defense Production Administration, shows that 136 had been issued for petroleum products. The average percentage of accelerated amortization of oil facilities was 75.5 per cent of total proposed investment. The average for all certificates issued was 67.9 per cent, and they covered $6,306,975,000 of a total of $9,286,892,000 to be invested in new defense facilities.

The figures for the oil industry did not include certificates granted for storage and transportation facilities.

**Investments.**—The DPA tabulation showed that 1,308 certificates were issued for all industries, for $5,824,061,000 of investment in production and fabrication of basic materials, including petroleum, the tax amortization allowed being $4,013,548,000 or 68.9 per cent; 1,214 certificates were for $1,204,318,000 for finished products, the amortization allowed being $848,051,000 or 70.4 per cent; 486 covered $1,393,772,000 for transportation and storage with amortization of $1,006,139,000 or 72.2 per cent; 60 covered $597,998,000 for public utilities with amortization of $276,716,000 or 46.3 per cent; and 260 were for miscellaneous products and services with amortization of $162,521,000 or 60.9 per cent.

# Industry Briefs

**WASHINGTON. — The Office of** Price Stabilization has taken the ceiling off commissions paid to distributors of petroleum products on consignment, one of 22 different services removed from price control because, according to OPS, they have little effect on the cost of living or cannot practicably be controlled.

**TULSA.—The Panhandle-Plains regional** meeting of Natural Gasoline Association of America will be held in Amarillo, Tex., November 20 at the Herring Hotel, instead of in that location December 7 as originally scheduled, the association announced here this week. John Kindle, Lone Star Producing Co., Dallas, is chairman of the program committee.

**WASHINGTON.—The Government** has approved a project of Stanolind Oil & Gas Co., Tulsa, for construction of a new research center in Tulsa. A. L. Solliday, executive vice president of the company, said that construction will get under way early this fall and the center will be completed within 18 months, barring shortages. Plans now call for reinforced concrete for framing instead of steel, Solliday said.

**WHITING, Ind.—Standard Oil Co.** (Ind.) has commenced construction of a sulfur-recovery plant which will produce 55 tons per day from hydrogen sulfide extracted from refinery gases at its 192,000 bbl. per day refinery here. Completion is scheduled for mid-1952.

**OIL CITY, Pa.—The Pennzoil Co.** of Oil City has purchased holdings of H. A. Logan and family of Warren, Pa., in Elk Refining Co. of Charleston, W. Va. The Elk refinery at Falling Rock, W. Va., is rated at 4,500 bbl. per day capacity.

**LOS ANGELES. — Formal opening** of Union Oil Co.'s new $5,000,000 research center at Brea, on the eastern outskirts of Los Angeles, has been set for early fall, possibly sometime next month. Movement of personnel from former quarters at Wilmington to the new center was started in July.

**FT. STOCKTON, Tex.—A new well** depth record for West Texas has been set at a rank wildcat test drilled 7 miles southeast of here in Pecos County. The new record was set by Gulf Oil Corp. 1 Theo Winfield, Sec. 3, Blk. 132, T&STL Survey, which was diamond-coring below 15,310 ft. in shale and lime of Pennsylvanian age. The depth is 31 ft. below the old record of 15,279 ft.

**LOS ANGELES.—To facilitate obtaining** materials and equipment from West Coast manufacturers, Petroleos Mexicanos opened offices here last week in the Bankers Building. Carlos Alvarez Garcia, who formerly was with the Mexican oil agency in New York and Houston, is in charge of the new offices.

**BATON ROUGE.—Louisiana's daily** oil production allowable for October has been set at 653,370 bbl., Commissioner S. L. Digby announced, representing little change from the September level of 657,481 bbl.

**NEW YORK.—The 1951 issue of Gas** Facts is now being distributed by the American Gas Association. The publication is the association's annual statistical yearbook and contains detailed data on the gas utility and pipe-line industry for the period 1937-1950 inclusive.

# CANADA

## Trans-Northern Line O.K.'d

OTTAWA.—The Federal Board of Transport Commissioners has granted permission to Trans-Northern Pipe Line Co. to build a petroleum products line from Montreal to Toronto and Hamilton, Ont., with branch lines to Prescott, Ottawa, and Clarkson. The order requires completion of the project by December 31, 1953.

Trans-Northern is a joint enterprise of British American Oil Co., Ltd., Shell Oil Co. of Canada, Ltd., and McColl-Frontenac Oil Co., Ltd. (The Texas Co.), all of which have refineries in Montreal with large wholesale and retail distribution in the areas to be served with the line.

## Alberta Gas Reserves Cited

CALGARY.—Alberta's natural-gas reserves were estimated last week at 13,707 billion cubic feet of which 8,415 billion is available for sale.

These estimates were made here by J. F. Dougherty of the engineering firm of DeGolyer & MacNaughton, Dallas, at hearings conducted by the Alberta Petroleum and Natural Gas Conservation Board. Dougherty supported Canadian Delhi Oil, Ltd., in its application for a permit to export natural gas from Alberta to eastern Canada.

Dougherty said there is available enough gas in Alberta to provide for the province's needs for 30 years plus a sufficient volume of 4,407 billion cubic feet which would be more than enough to meet Canadian Delhi's requirements of 365 million cubic feet a day for their proposed Trans-Canada Pipe Lines, Ltd., project. The proposed pipe line would have a length of 2,983 miles. Of this total, there would be 747 miles of gathering lines in Alberta.

# WEST COAST

## Open-Hole Record Set

LOS ANGELES.—California's deepest wildcat of the year, General Petroleum Corp. 48-7 Boston Land Co. in the Huron area of Kings County, set a new state record for open-hole footage before being abandoned at 14,911 ft. last week.

A string of 1,486 ft. of 13⅜-in. surface casing had been set, but below that was approximately 13,500 ft. of open hole ranging in diameter from 12¼ to 8¾ in.

Actual record of hole sizes below the surface pipe is as follows: 12¼ in. from 1,486 to 8,735 ft., 11 in. to 9,860, 10⅝ to 13,356, 9⅞ to 13,949, 9⅝ to 14,453, and 8¾ in. to the last available depth of 14,911 ft.

About a month ago, while drilling at approximately 13,500 ft., some difficulty was experienced from sloughing of an up-the-hole shale bed. This was remedied, however, and since then the long section of open hole has given no trouble.

A combination string of 4½ and 3½-in. drill pipe was used, with the bottom 8,500 ft. of the string being 3½ in. However, 4½-in. alone was used to 14,494 ft. This feat is believed to be a new California record for length of 4½-in. string.

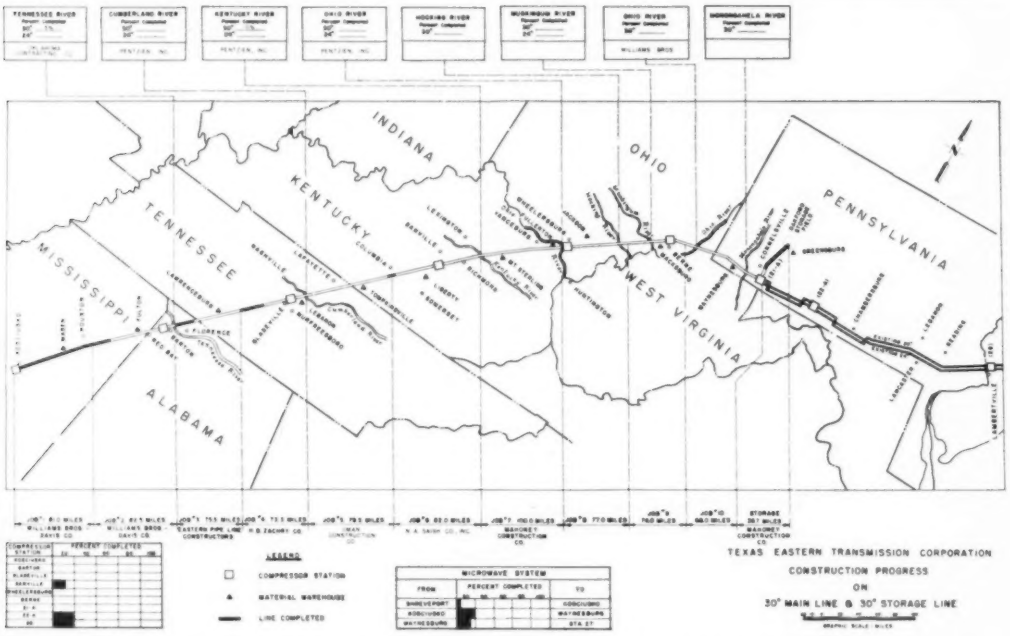
# MEETINGS

## W.P.R.A. Meeting Held

CASPER, Wyo.—"Application of Radiant Heat to Visbreaking and Vacuum Operations," by J. W. Sandberg, of Phillips Petroleum Co., and "Octane Numbers," by A. D. Puckett, of E. I. du Pont de Nemours & Co., Inc., were two papers highlighting the regional meeting of Western Petroleum Refiners Association here last week.

Sandberg's paper dealt with the employment of a radiant heater using ceramic-cup burners in visbreaking operation which, coupled with high-vacuum flashing, results in reduction of fuel-oil fraction and increased yields of catalytic cycle oil feed stock. In the discussion following presentation of this paper many questions were asked regarding operation of the radiant heater. This heater, originally used in the metallurgical industry and lately adapted for petroleum refining use, has also been described in a previous paper (*The Oil and Gas Journal, May 10, 1951, p. 106*).

The discussion on "Octane Numbers" was concerned with combustion-chamber deposits. Octane-number increases obtainable in the laboratory and on the road were also dealt with.




*TEXAS EASTERN PROJECT.—This map shows various spreads contracted by Texas Eastern Gas Transmission Co. on its Mississippi-to-Pennsylvania natural-gas line.*

# Texas Eastern Project

## Big expansion program including 791-mile gas line from Mississippi to Pennsylvania moving ahead on schedule

**F. Lawrence Resen**

SHREVEPORT.—Construction is moving ahead on Texas Eastern Gas Transmission Corp.'s 791-mile, 30-in. natural-gas line from Kosciusko, Miss., to a tie-in point with its existing system near Connellsville, Pa.

As of the first of the month, 150.1 miles of line had been laid, 325 miles of pipe shipped from the factory, construction started on a 30-in. crossing of the Tennessee River, and 740 miles of right-of-way purchased.

Present schedules call for completion of the line as far north as the first crossing of the Ohio River by January 1952.

The over-all construction program, which will result in a total system of over 4,200 miles and call for sales of gas at the rate of 1.2 billion cubic feet daily, also includes development of a 19,000-acre natural-gas storage field in western Pennsylvania, 12 new compressor stations, and a 35-mile, 30-in. connecting line from Connellsville to the storage field. Brown & Root, Inc., Houston, is general contractor on the entire expansion project.

**Capacity.**—The new line will have a capacity of 400,000,000 cu. ft. of gas daily, but by use of the storage field and facilities east of Connellsville, increased sales capacity over the system's present capacity will be 465,000,000 cu. ft. per day. Cost of the line, plus new compressor stations, will be approximately $99,200,000. Coupled with development of the storage field, cost will total around $114,300,000.

**Compressor stations.**—Compressor stations along the line, with their capacities, will be: Kosciusko, 12,500 hp.; Mattes, Pa., 6,600 hp., eventually to be increased to 11,880 hp.; Danville, Ky., 8,800 hp.; Connellsville, Pa., 4,400-hp.; Lambertville, N. J., 4,400 hp.; Chambersburg, Marietta, and Phoenixville, Pa., aggregating 30,000 hp.; Barton, Ala., Gladeville, Tenn., and Wheelersburg, Ohio, 7,500 hp. each; and Berne, Ohio, 10,000 hp.

New compressor stations will provide 70,080 additional horsepower for the Texas Eastern system, and the reactivation of four pumping stations will provide 34,400 hp., giving the total system an over-all compressor horsepower of 381,880.

**River crossings.**—Oklahoma Contracting Co. has contract for the Tennessee River crossing. Other river-crossing contracts were let to Pentzien, Inc., for the Kentucky-Ohio job and Williams Bros. for the Ohio-West Virginia job. Crossings not yet contracted include the Cumberland, Kentucky, Hocking, Muskingum, and Monongahela rivers.

**Storage project.**—Texas Eastern has joined with New York State Natural Gas Corp. in developing the Oakford underground storage project 35 miles north of Connellsville. The reservoir is a substantially depleted gas field with an original capacity of 500 billion cubic feet. In addition to the wells already drilled, several new ones will be drilled to increase deliverability of gas both to and from the field.

A compressor and injection station, costing $7,500,000, will be erected at the field with a total horsepower of 30,000. In the initial stages, 45 billion cubic feet of gas will be injected as a base, and 60 billion cubic feet deposited against future withdrawals.

# World Production Drops

## Output fails to set new record in July for first time this year, but most areas except Iran show increases

**Ted A. Armstrong**

FOR the first time this year world crude output has failed to set a new record. With the exception of Iran, however, the trend is still upward.

Production during July averaged 11,703,800 bbl. daily, compared with a June output of 12,003,900 bbl. daily.

Even with the 300,000-bbl. drop from June, July production still was 10.9 per cent above the year-ago figure of 10,550,600 bbl. daily, and a further increase is expected in the world's important producing areas, particularly the Middle East, as efforts continue to make up the loss in Iran, which showed a 522,000-bbl. drop during July.

**Reason for drop.**—The strangulation of the oil industry in Iran resulting from the fight over nationalization effectively halted production there in July.

Production during the early part of the month, when the Abadan refinery still was processing crude and running products to storage, gave the country a daily average of 116,000 bbl. for the month. This was in sharp contrast with a daily output of 638,500 bbl. in June and 691,200 bbl. in May—the last month of full production.

The shutdown in Iran resulted in stepped-up operations in other parts of the Middle East, with Kuwait and Saudi Arabia registering big gains and promising even a further increase.

In Kuwait production jumped from a June daily average of 528,500 bbl. to a July average of 646,000 bbl., an increase of 22.2 per cent. Saudi Arabia also registered a big gain, climbing from 758,700 bbl. daily in June to 820,100 in July, an increase of 8.1 per cent. Current reports indicate that Saudi Arabia's August production was about 838,000 bbl. daily, and a similar increase is expected to be shown for Kuwait.

During the first 6 months of this year Kuwait had averaged 447,200 bbl. per day and Saudi Arabia 671,200 bbl. per day.

**Western Hemisphere.**—Canadian production continued to climb in July, reaching another all-time high of 157,500 bbl. daily.

The figure is an increase of 5,400 bbl. daily over the June output and represents a sharp rise from the first-half average production of 106,900 bbl. per day.

Mexican production also registered an increase for the month, with a reported production of 205,000 bbl. daily, a 15,000-bbl. gain over June.

Current drilling activity points to a further increase in Mexico's production. Latest development is the discovery of high-gravity oil in Jose Colomo 2, claimed by Pemex to be

**WORLD CRUDE-OIL PRODUCTION**
**(Thousands of barrels daily)**

| Country— | July 1951 | June 1951 | July 1950 |
|---|---|---|---|
| **Western Hemisphere:** | | | |
| Argentina | 72.5 | 72.5 | 60.0 |
| Bolivia | 1.5 | 1.5 | 1.7 |
| Brazil | 1.4 | 1.4 | 0.5 |
| Canada | 157.5 | 152.1 | 80.0 |
| Chile | 1.7 | 1.7 | 1.5 |
| Colombia | 106.4 | 109.0 | 97.4 |
| Cuba | 0.3 | 0.3 | 0.2 |
| Ecuador | 7.3 | 7.3 | 7.1 |
| Mexico | 205.0 | 190.0 | 195.2 |
| Peru | 45.3 | 44.8 | 40.0 |
| Trinidad | 57.3 | 55.5 | 56.3 |
| Venezuela | 1,717.1 | 1,699.4 | 1,533.3 |
| Total | 2,373.3 | 2,335.5 | 2,073.2 |
| **Europe and Africa:** | | | |
| France | 5.5 | 5.7 | 2.9 |
| French Morocco | 1.8 | 1.7 | 0.8 |
| Germany | 26.6 | 26.3 | 21.9 |
| Italy | 0.2 | 0.2 | 0.2 |
| Netherlands | 14.2 | 14.0 | 14.4 |
| Egypt | 45.8 | 47.1 | 40.1 |
| United Kingdom | 0.9 | 0.9 | 0.9 |
| Total | 95.0 | 95.9 | 81.2 |
| **Middle East:** | | | |
| Bahrein | 30.1 | 30.0 | 30.3 |
| Iran | 116.0 | 638.5 | 691.2 |
| Iraq | 173.9 | 171.0 | 128.5 |
| Kuwait | 646.0 | 528.5 | 363.7 |
| Qatar | 48.0 | 45.4 | 35.2 |
| Saudi Arabia | 820.1 | 758.7 | 558.6 |
| Turkey | 0.3 | 0.3 | 0.8 |
| Total | 1,834.4 | 2,172.4 | 1,808.3 |
| **Other Asia:** | | | |
| British Borneo | 100.0 | 100.0 | 82.0 |
| Burma | 2.0 | 2.0 | 1.5 |
| China | 2.2 | 2.2 | 1.5 |
| India | 5.0 | 5.0 | 5.2 |
| Indonesia | 150.0 | 150.0 | 135.0 |
| Japan | 7.0 | 7.0 | 6.0 |
| New Guinea | 4.8 | 4.8 | 4.8 |
| Pakistan | 3.0 | 3.0 | 3.9 |
| Total | 274.0 | 274.0 | 239.9 |
| Total foreign less Russia and E. Europe | 4,576.7 | 4,877.8 | 4,202.6 |
| **Estimated Russia and Eastern Europe:** | | | |
| Austria | 37.0 | 37.0 | 25.0 |
| Romania | 85.0 | 85.0 | 85.0 |
| Russia | 800.0 | 800.0 | 730.0 |
| Other E. Europe | 22.1 | 22.1 | 23.6 |
| Total | 944.1 | 944.1 | 863.6 |
| Total foreign | 5,520.8 | 5,821.9 | 5,066.2 |
| United States | 6,183.0 | 6,182.0 | 5,484.4 |
| World total | 11,703.8 | 12,003.9 | 10,550.6 |

Figures are from reliable reports in the industry or official government sources. Data for Russia and Eastern Europe are based on competent estimates; no authentic information is available on month-to-month production in these areas. Completely current reports also are lacking for certain countries of Southeast Asia. Data for earlier months have been revised where necessary.

as good a well as the 1,900-bbl. field discovery. Completion of the third well in the new field is scheduled by the end of September.

Production in the United States showed only a 1,000-bbl. increase in July, rising to a total of 6,183,000 bbl. daily.

Peru and Trinidad showed small gains during the month, but, except for Venezuela, output in other Western Hemisphere countries was unchanged.

**Venezuela.**—The world's second largest producing country, now almost at its maximum efficient rate of production, continued to show an increase in July, although it was small percentagewise.

Output rose from June's 1,699,400 bbl. daily to 1,717,100 bbl. in July. The figure compares with an average for the first 6 months of this year of 1,673,000 bbl. daily.

The weekly production trend is shown in these figures: Week ended July 2, 1,710,300 bbl. daily; July 9, 1,710,100 bbl.; July 16, 1,719,700 bbl.; July 23, 1,714,400 bbl.; and July 30, 1,728,500 bbl. daily.

Production in Venezuela by companies during July (average barrels daily) was: Creole, 781,043; Shell, 523,184; Mene Grande, 248,927; Socony-Vacuum, 48,843; Texas, 24,982; Mercedes, 23,116; Atlantic, 18,549; Richmond, 18,155; Sinclair, 12,551; Pantepec, 10,013; Phillips, 6,787; and British Controlled Oilfields, 982.

**Other areas.**—Production in Egypt showed a slight drop during July. In Europe, production was virtually unchanged. This was true also in the Far East.

The total world production of 11,703,800 bbl. daily in July includes an estimated 944,100 bbl. daily being produced in Russia and the Communist-dominated countries of eastern Europe.

The foreign total exclusive of the Russian-controlled areas amounted to 4,576,700 bbl. per day, a drop from June of 301,000 bbl.

**TREND OVER THE LAST YEAR**

| 1950— | Western Hemisphere | Middle East | Total foreign less Russia and E. Europe |
|---|---|---|---|
| August | 2,097.8 | 1,839.5 | 4,273.6 |
| September | 2,146.1 | 1,803.7 | 4,297.1 |
| October | 2,185.7 | 1,893.2 | 4,428.9 |
| November | 2,213.8 | 1,899.1 | 4,474.1 |
| December | 2,213.6 | 1,988.9 | 4,563.0 |
| 1951— | | | |
| January | 2,210.9 | 1,874.2 | 4,450.9 |
| February | 2,220.3 | 1,947.4 | 4,536.8 |
| March | 2,254.1 | 1,961.1 | 4,581.1 |
| April | 2,261.5 | 2,013.4 | 4,632.1 |
| May | 2,314.0 | 2,203.8 | 4,878.4 |
| June | 2,335.5 | 2,172.4 | 4,877.8 |
| July | 2,373.3 | 1,834.4 | 4,576.7 |

## Tanker Fleet Increases

The world's tanker fleet increased by 1,030,000 dwt. tons during the first half of this year and now totals 28,645,111 dwt. tons, according to the semiannual review of John I. Jacobs, Ltd., London shipowners and brokers.

New deliveries totaled 1,083,000 dwt. tons, but there were some reductions, due largely to conversions.

Liberia registered the largest increase, adding 193,000 tons, followed by the United Kingdom and Norway, which added 175,000 tons each. Italy added 100,000 tons, and the Argentine and Japanese fleets were increased by 85,000 tons each. France added 38,000 tons to bring the French tanker fleet above 1,000,000 tons for the first time in history.

In spite of high prices, there were a record 485 tankers on order on June 30 with an aggregate tonnage of more than 9,000,000. Orders placed during the first 6 months of this year were for nearly 4,500,000 tons, Jacobs said, and contracts announced since then call for construction of another 600,000 tons.

The study forecast a continuation of the tanker-construction trend and said it now is assured that additions will be at the rate of at least 2,000,000 tons yearly for the next 4 years. The report based this forecast on the fact that of the 9,000,000 tons now on order, contracts call for delivery of 1,400,000 tons during the last half of this year, 2,800,000 tons next year, 2,500,000 tons in 1953, and much of the rest in the following 2 years.

Of the total ships on order, 83 will be in the 24,000 to 32,000-ton class. One tanker of 40,000 tons has been ordered from a German yard, the report said.

# EUROPE

## Coryton Work Progresses

Construction is moving ahead rapidly on the 20,000-bbl. refinery of Socony-Vacuum Oil Co., Inc., and Powell Duffryn, Ltd., at Coryton, Essex, about 25 miles below London Bridge on the Thames.

The refinery, which will specialize in production of lubricating-oil stocks, is now expected to be in operation by the end of 1952.

Process facilities will include a Thermofor catalytic cracking unit, the first in England, a thermal reforming unit, two-stage distillation unit, propane deasphalting unit, M.E.K. dewaxing, and furfural-treating facilities.

Until recently, work on the refinery site had been devoted altogether to site preparation. At high tide, ground level of the area is 8 ft. below that of the Thames and a large part of the area was marshy and incapable of supporting heavy loads.

To date more than 500,000 tons of gravel have been spread in leveling operations and more than 10,000 50-ft. piles have been driven.

At present foundations are being poured and tankage is being erected. Some preliminary work on process units also is in progress.

Principal contractors are Lummus Co., Ltd., and Foster Wheeler Co., Ltd. Cost of the project is estimated at $30,000,000. An announcement of Vacuum Oil Co., Ltd., which will operate the refinery and which is jointly owned by Socony-Vacuum and Powell Duffryn, said 95 per cent of the equipment and material for the refinery is being supplied by British manufacturers.

## Denmark Plant Slated

A 2,000-bbl. thermal cracking plant, the country's first, will be built soon in Denmark for A. P. Moller, a leading Danish tanker operator.

Operating on heavy fuel oil, the refinery's principal products will be gas, which will be piped into Copenhagen to supplement the city's present supply of coal gas, and liquefied petroleum gas.

Daily output of the plant, to be built on the site of the recently dismantled Provestenen fort in Copenhagen Harbor, will consist of 3,500,000 cu. ft. of gas, 11,000 gal. of L.P.G., 300 bbl. of gasoline, and 725 bbl. of other products, including some aromatic solvents.

Cost of the project will be about $3,500,000. Moller is now negotiating with the Danish alcohol-manufacturing monopoly, De Danske Spritfabriker, and with private companies concerning the possible addition of facilities to produce ethylene.

The pipe line to Copenhagen is expected to cost $865,000. The city of Copenhagen has agreed to pay between 80 and 90 per cent of the cost.

## Exports Orders Climb

Export orders placed by British oil companies with British manufacturers of petroleum equipment rose by more than 25 per cent during the second quarter of this year as compared with the previous quarter, according to figures compiled by the Oil Companies Materials Secretariat in London.

The value of export orders placed during the April-June period was £15,573,840, bringing the total value of such orders during the first half of the year to £27,966,440. The main items ordered during the second quarter were specialized drilling and production equipment, £2,168,945; tubular goods, pipe fittings, and valves, £2,096,013; automotive equipment £1,605,155; and drums, drum sheets, and tin plate, £1,594,653.

The Petroleum Information Bureau in London said that since January 1948 British manufacturers have provided British oil companies with almost £200,000,000 worth of petroleum equipment which formerly would have cost dollars.

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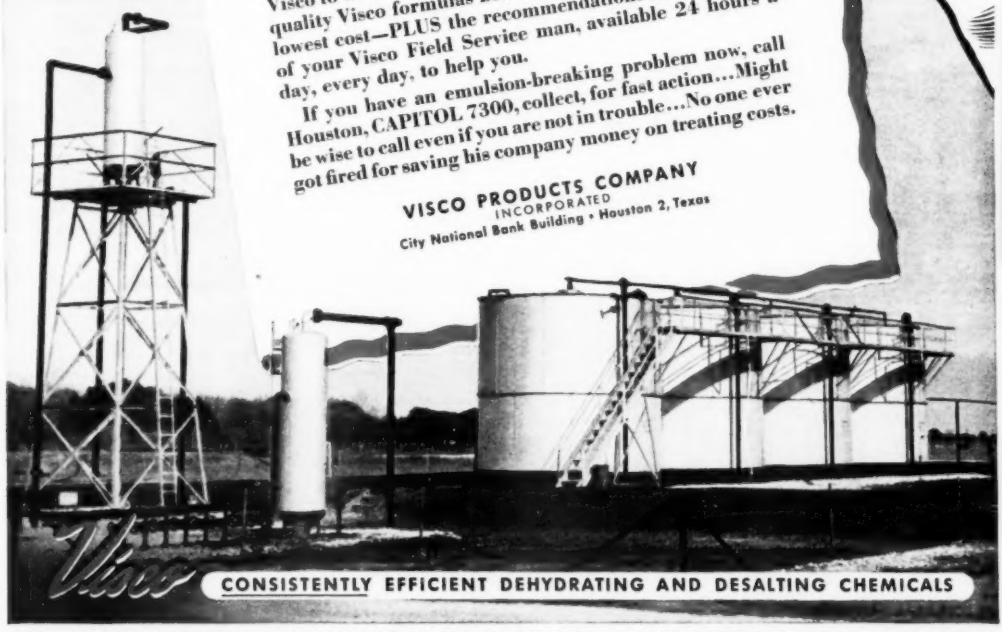

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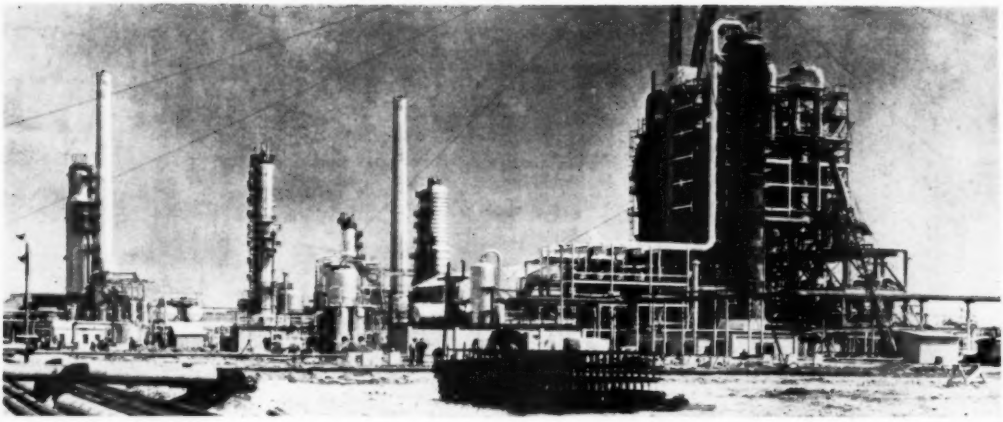


*GROWING INDUSTRY.—One of the many new refinery installations in Europe which will help meet increasing demands for petroleum products is this catalytic cracking unit at Esso Petroleum Co., Ltd.'s, plant at Fawley, England.*

# Europe's Crude Source

## Increasing demands due to refinery expansion must be met by oil from the Middle East, Egloff Tells N.P.A.

THE current refinery-construction program in Europe will greatly increase the demands for crude oil there and the source of this crude must be the Middle East, Dr. Gustav Egloff of Universal Oil Products Co. told the Atlantic City meeting of the National Petroleum Association in reporting on a survey of European refineries he made during the summer.

The crude throughput of European refineries is scheduled to reach 1,302,000 bbl. daily by 1952-53, or nearly five and one-half times the prewar rate, but the Middle East has the reserves to meet this demand and can supply it if political conditions are favorable, he said.

©Bachrach
*GUSTAV EGLOFF*

The Middle East has the greatest reservoir of oil known in the world today—one of the world's greatest sources of economic wealth—with an ultimate potential of 200 billion barrels of oil valued at more than 300 billion dollars, Egloff asserted.

"Proven reserves are over 40 billion barrels of oil, about 46 per cent of the world's proven deposits, while the United States has about 30 billion barrels of proven oil reserves and about 100 billion barrels potential.

"The vast oil richness of the Middle East countries, Iran, Saudi Arabia, Kuwait, Iraq, Qatar, and Bahrein, is reflected in the average daily rate of production which during 1950 was 1,700,000 bbl. from 315 wells averaging 5,400 bbl. each. In contrast, the United States averages 12 bbl. a day from its 444,000 producing wells or a total of about 5,400,000 bbl. a day."

Egloff's report reviewed the development in each of the Middle East countries and then described the expansion of European refinery capacity and demand as follows:

**Exports to Europe.**—The largest market for middle eastern oil is western Europe (outside of the Iron Curtain). Just before the Iranian crisis, 875,000 bbl. of crude oil or about 44 per cent of the total production was being exported to western European refineries. Of this total, 125,000 bbl. of crude came from Iran. Exports of refined products were at the rate of 175,000 bbl. per day from the Middle East, 135,000 of which came from Iran. These exports of crude oil and refined products accounted for about 90 per cent of the total West European demand.

Increases in exports from countries other than Iran will be necessary not only to make up the deficit caused by loss of Iranian crude and refined products but also to meet growing West European demands. The rise in demand will be principally for crude oil to feed European refineries now being constructed.

**Refinery expansion.**—In western Europe most of the refinery capacity was destroyed by bombing and after the war rehabilitation of old and construction of new refineries was needed to assist economic recovery. European nations wanted to be self-sufficient in regard to refined-oil supplies, and the Economic Cooperation Administration was willing to assist in the refinery-expansion program. It was believed that if European imports of refined products could be minimized and crude oil imported for refineries to manufacture such products for domestic consumption, the dollar shortage in Europe could be greatly lessened and a better trade balance established.

Of the $235,000,000 capital expenditures necessary for refinery expansion, the ECA has supplied $35,000,000 up to December 31, 1950. A major portion of the refinery expansion has been made by European subsidiaries of United States companies.

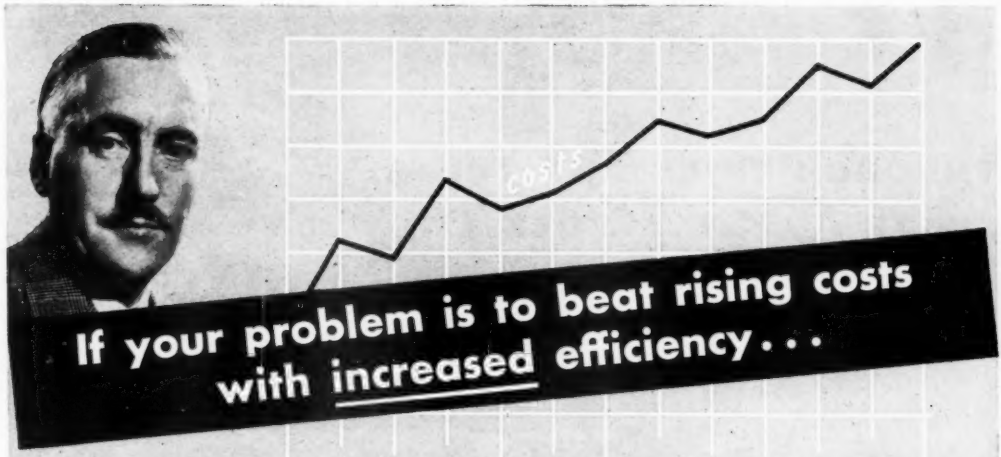
A brief summary of European petroleum product demands and refinery production prewar, in 1951, and with estimated figures for the 1952-53 fiscal year is given in Table 1. The 1951 western European demand for petroleum products is twice that of the prewar years.

The refinery throughput and output of western European countries is given by the Organization for European Economic Cooperation in its second report on coordination of oil-refinery expansion, dated August 1951. These data are given in Table 2. The last three columns show the anticipated quantities through the fiscal year of 1952-53 as estimated in December 1950.

Refinery throughputs will have in-

**TABLE 1—EUROPEAN DEMAND AND REFINERY PRODUCTION**
(Barrels per day)

| | Prewar | 1951 | 1952-53 (fiscal) |
|---|---|---|---|
| Demand | 520,000 | 1,125,000 | 1,220,000 |
| Refinery production | 240,000 | 1,039,000 | 1,184,000 |

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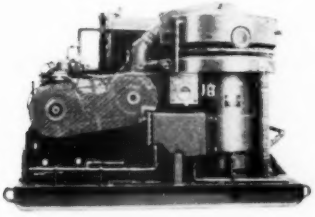

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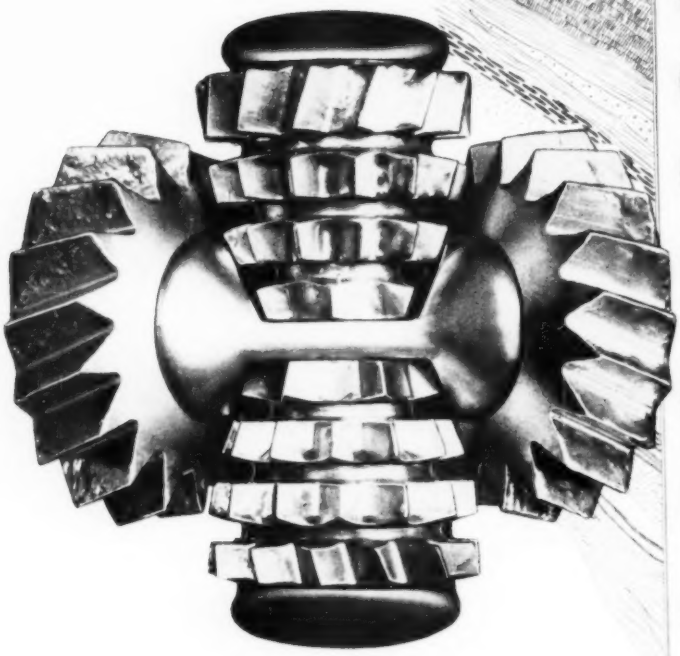

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*CRUDE SOURCE.—Crude oil to supply Europe's vastly expanded refining industry must come from the Middle East oil fields, which hold the world's richest reserves. Loss of output in Iran must bring stepped-up production in other areas.*

**TABLE 2—CRUDE-OIL DATA FOR WESTERN EUROPEAN REFINERIES**
(Barrels per day)

| | Prewar (average) | 1948-49 | 1949-50 | 1950-51 | 1951-52 | 1952-53 |
|---|---|---|---|---|---|---|
| Refinery throughput | 240,000 | 460,000 | 624,000 | 936,000 | 1,149,000 | 1,302,000 |
| Refinery output | 224,000 | 418,500 | 582,500 | 860,000 | 1,042,000 | 1,185,000 |

creased nearly 5.5 times over prewar by 1952-53.

Table 3 gives the estimated throughput of western European refineries in 1952-53 by countries.

Western European consumption of refined products, a prewar average, the actual consumption for 1948-49 and 1949-50, and the anticipated demand for three succeeding fiscal years are given in Table 4.

As a result of the modern refinery-expansion program, the United Kingdom, France, Italy, western Germany, and Holland will soon be able to supply their domestic demands for refined products from their own refineries.

**TABLE 3—1952-53 ESTIMATED THROUGHPUT OF EUROPEAN REFINERIES**
(Barrels per day)

| | |
|---|---|
| United Kingdom | 426,000 |
| France | 339,000 |
| Italy incl. Trieste | 193,800 |
| Benelux | 162,000 |
| Germany | 127,000 |
| Sweden | 25,000 |
| Portugal | 6,400 |
| Switzerland | 2,000 |
| Turkey | 1,200 |
| Norway | 800 |
| Denmark | 600 |
| Total | 1,303,400 |

**England.**—In the United Kingdom, large refinery-expansion projects are under way at Fawley, at Llandarcy in Wales, at Grangemouth in Scotland, and in Kent. The Fawley refinery, the largest in Europe, is being constructed by the British subsidiary of Standard Oil Co. (N. J.), and will shortly be in full operation. It operates on Middle East crudes and will require 126,000 bbl. per day. The catalytic cracking plant has a capacity of 41,000 bbl. a day. The lubricating-oil capacity will be 4,000 bbl. a day. The thermal reforming units will be used to improve the octane rating of straightrun gasoline.

**France.**—A total of 300,000 bbl. a day of crude oil were refined in 1950, 27 per cent more than in 1949. For the year 1950-51, 360,000 bbl. per day were processed. French refineries are now supplying all of the domestic demand for refined products with the exception of small amounts of specialties and are exporting to adjoining countries as well.

**TABLE 4—TOTAL DOMESTIC CONSUMPTION OF FINISHED PRODUCTS**
(Barrels per day)

| | Prewar (average) | 1948-49 | 1949-50 | 1950-51 | 1951-52 | 1952-53 |
|---|---|---|---|---|---|---|
| Motor gasoline | 278,500 | 249,000 | 284,000 | 349,000 | 377,000 | 394,000 |
| Kerosine | 45,500 | 62,800 | 62,800 | 69,200 | 71,500 | 78,000 |
| Gas and diesel oil | 51,600 | 160,800 | 190,500 | 224,200 | 242,000 | 258,000 |
| Fuel oil | 101,300 | 202,500 | 244,000 | 286,500 | 316,000 | 352,000 |
| Lubricants | 30,700 | 28,800 | 36,400 | 38,350 | 40,250 | 42,200 |
| Miscellaneous products | 43,400 | 63,100 | 75,000 | 86,800 | 98,700 | 112,300 |
| Total | 551,000 | 767,000 | 892,700 | 1,054,050 | 1,145,450 | 1,236,500 |

**Germany.**—Total refining capacity will be 127,000 bbl. per day in 1952-53. The refineries include facilities for hydrogenating 30,000 bbl. a day of residual fuel oil. By 1952, it is expected that present cracking capacity of 20,000 bbl. a day will be increased by an equal amount in thermal cracking and 24,000 bbl. in catalytic cracking capacity. Germany has the largest lubricating-oil capacity in Europe, 9,200 bbl. a day.

**Italy.**—Here the refinery capacity is to be augmented by 40,700 bbl. per day to reach a total of 193,800 bbl. by mid-1953. At five different localities, new units are planned or under construction. The largest of these is at Milan, where the capacity will be 30,000 bbl. a day.

**Lubricating oils.**—The necessity of refining expansion to meet rising requirements for petroleum products is particularly well illustrated by data on lubricating-oil imports and production. Demand for lubricating oils in European countries in 1950 was about 39,000 bbl. a day. The imports of lubricating oils into western European countries in 1949 and 1950 are given in Table 5.

**TABLE 5—IMPORTS OF LUBRICATING OILS**
(Barrels per day)

| | 1949 | 1950 |
|---|---|---|
| United Kingdom | 5,650 | 8,400 |
| France | 1,248 | 1,180 |
| Netherlands | 1,323 | 1,710 |
| Italy | 1,440 | 1,840 |
| Sweden | 613 | 1,210 |
| Western Germany | 192 | 211 |
| Belgium-Luxembourg | 1,305 | 2,050 |
| Denmark | 518 | 748 |
| Norway | 633 | 594 |
| Switzerland | 441 | 748 |
| Ireland | 268 | 268 |
| Portugal | 249 | 192 |
| Total | 13,880 | 19,151 |

MIDDLE EAST

# Iran May Eject British

## Authorities discussing advisability of throwing out Abadan technicians without formality of an ultimatum

IRANIAN authorities this week were discussing the advisability of ejecting British technicians at the huge Abadan refinery without the formality of sending an ultimatum to Britain.

The nation's political leaders went into a huddle on the question after Britain rejected Iran's latest note asking for a resumption of negotiations on the possibility of bringing to life the now-dormant petroleum industry.

Iran had sent the British a note restating its proposals for a nationalized oil-industry operation. It was similar to the communication addressed earlier to W. Averill Harriman but did not contain the ultimatum warning Britain that residence permits of all British oil workers would be canceled if negotiations were not reopened within 15 days. The British rejected the proposals without comment.

At Abadan the trend of events was continuing. Iranian officials took over two more British-operated activities—the communications and transportation departments of Anglo-Iranian Oil Co., Ltd. They also ordered James Cunningham, head of the communications department, to leave the country immediately for "withholding technical information." Four of his assistants also were scheduled to leave.

**Oil deals.**—While there was no progress toward a settlement of the dispute, there were several developments in the world petroleum picture from the fight.

Anglo-Iranian Oil Co., Ltd., disclosed it has agreed to purchase 200,000 tons (about 1,500,000 bbl.) of bunker fuel from Communist-dominated Romania. The British firm said the oil will be moved from Constanta, a Romanian port on the Black Sea, to bunkering ports in the Mediterranean and Red Sea. Sterling is to be used for payment.

In Iran there was a report that Russia had made inquiries concerning the purchase of oil there. Earlier Iran reported that an agreement had been reached covering the sale of products to Afghanistan, and before that there were reports that two Iron Curtain countries had been negotiating for the purchase of oil.

**Other developments.**—From Washington Averill Harriman, President Truman's representative in the recent fruitless negotiations, wrote Premier Mossadegh that he could not forward to Britain Iran's ultimatum threatening to expel all British technicians if Britain did not reopen talks within 15 days.

Harriman told Mossadegh he felt the ultimatum would only make matters worse and urged him to reconsider his approach.

United States Ambassador Henry F. Grady left Iran September 19 after telling newsmen: "My personal conviction is that it is quite useless to talk to Mossadegh. He just makes the same speech over and over again."

Grady is being succeeded by Loy W. Henderson, whose appointment was confirmed September 18 by the Senate.

Shah Mohammed Riza Pahlevi entered Iran's political picture last week in an effort to prevent a further split in parliament and help quiet the growing tension within the country.

The Shah appealed to the parliamentary leaders for greater harmony in view of the "delicate situation." He also urged them to take "fundamental steps to insure work, bread, and health for every individual of the country."

The Shah spoke as the growing economic crisis increased talk of an overthrow of the present government.

With no oil revenue coming in, the nation is nearing a crisis, and the $25,000,000 loan promised by the World Bank has been held up, presumably because of the question of Iran's ability to repay the loan with oil operations at a standstill.

LATIN AMERICA

# Line Work to Start

## Colombia products carrier to be finished by March

WILLIAMS BROTHERS CORP. will begin main-line construction the first week in October on the 87-mile, 6⅝-in. products pipe line from Puerto Salgar to Bogota, the capital of Colombia.

By the end of September it is expected that there will be 2,500 tons of pipe on hand, with a total of 4,000 tons required for the line. Completion of the projects is anticipated by March 1 next year.

About 20 km. of right-of-way already has been cleared, and some foundation work has been done on the three pump stations which will move the products along the uphill route.

Bogota now depends on rail transportation for its petroleum products, and interruptions in rail service in the past have resulted in shortages requiring rationing of gasoline for automobiles.

With the three pump stations, the line will have a capacity of 8,850 bbl. per day. Capacity may be increased by use of additional stations to 22,000 bbl. per day. Cost of the project is estimated at $3,500,000.

**Rough country.**—The line will cross difficult mountainous country, climbing from an elevation of about 570 ft. at Salgar, on the Magdalena River, to 8,600 ft. at Bogota. Maximum elevation on the route is about 9,000 ft., reached about 35 miles from Bogota.

The line is being built for the Department of Cundinamarca, which was granted a concession from the Government of Colombia.

Products for the line initially will be supplied to Salgar by river barge. It is another link in the projected Colombian products pipe-line system, which now consists of one 69-mile, 6-in. line from the Barrancabermeja refinery to Cantimplora, near Puerto Berrio.

A line closing the gap from Cantimplora upriver to La Dorado, across the river from Salgar, is under study. Also under consideration is a line connecting with Medellin, a manufacturing center now served by high-cost rail transportation.

# International Briefs

**Expansion and modernization of** Colombia's Barrancabermeja refinery has been assured by the grant of an $8,000,000 loan to Empresa Colombiana de Petroleos by Chemical Bank & Trust Co., New York. International Petroleum Co. (Columbia) Ltd., already has offered a loan of $10,000,000. These, plus income of Empresa from the De Mares concession, which it took over from Tropical Oil Co. August 25, will permit undertaking the large refinery project. The refinery now has a capacity of 25,000 bbl. daily. Although title has passed to the Columbian government, the refinery will be operated on a leased basis by International Petroleum.

**Regent Oil Co. has been issued a** permit authorizing acquisition of a 25-acre site at Canvey Island, Essex, where it plans to construct an oil terminal. Plans call for expenditure of about $1,400,000 for construction of 25 storage tanks and an 800-ft. two-headed jetty.

**A tank farm with a capacity of** 2,000,000 gal. is being built by Petroleos Mexicanos at the border city of Juarez. Construction is expected to be finished by the end of December.

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# PERSONALS

## Production Head

### Terry has had 22-year career with Texas Co.

MARK L. TERRY, who in July took over duties as Oklahoma division manager in the producing department of The Texas Co., Tulsa, has a background of 22 years' service with Texaco.

He succeeded M. J. Heald who relinquished his duties to become an independent consultant.

A native of Jamesport, Mo., Terry was graduated from University of Missouri School of Mines, Rolla, Mo., in 1920. He joined Josey Oil Co. immediately after graduation and stayed with the company until 1929 when Texaco bought the Josey firm.

He then entered the service of Texaco as a petroleum engineer at Tulsa. In 1936 he was made assistant division engineer, and in 1937 he was appointed division engineer at Tulsa. His promotion to assistant division manager of the Oklahoma-Kansas division came in 1941.

July 1, 1943, Terry was appointed assistant manager of the Rocky Mountain division at Denver and served in this capacity until April 1, 1947. At that time he was returned to Tulsa as assistant manager of the Oklahoma division, the post he held until his present appointment.

**F. C. Lantz,** assistant to the vice president of transportation of Imperial Oil Co., Ltd., has been appointed manager of the newly formed pipe-line department. The new department will be responsible for pipe lines owned by Imperial and for the company's interest in joint pipe-line operations with other firms.

**William E. Stiles** has joined Buffalo Oil Co. as vice president in charge of engineering. In this capacity Stiles will direct the engineering development of the firm's producing properties from Buffalo's headquarters in Dallas.

**Robert W. Harrison,** formerly associated with R. B. Mitchell Co., consulting geologists and petroleum engineers, has organized Robert W. Harrison & Co., consulting petroleum engineers and geologists, at Houston.

**C. E. Hurd** has been transferred from Kansas City to Oklahoma City as refinery superintendent for Mercury Oil Refining Co.

**G. W. Meier,** geologist for Continental Oil Co. at Tahoka, Tex., has been transferred to the Oklahoma City geological staff.

**Ben Powell,** tool pusher for Penrod Drilling Co., has been transferred from Snyder to Spur, Tex.

**Lyman H. Bell** has been elected president of Hoosier Gas Corp. and Hoosier Pipe Line Corp., succeeding the late E. J. Meade. Bell was formerly with Central West Utility Co. of Kansas City, for whom he has acted as president and general manager for the last 12 years. **I. L. Stine** has been elected vice president of both companies.

**C. R. Vandervoort,** independent oil operator, has been appointed manager of the new district office being established at Midland, Tex., by Midstates Oil Corp. **Jack A. Menish,** formerly with Stanolind Oil & Gas Co., is the district geologist for Midstates for the Permian basin. **Claron H. Madsen** is the assistant district geologist. He was formerly with Phillips Petroleum Co. **Lawrence Williams,** who has had wide experience in the oil business as an independent, is to be West Texas scout.

**H. R. Rohwedder,** superintendent of construction at Texas-Illinois Pipe Line Co.'s Little Rock, Ark., compressor station, has been transferred to Chicago as assistant superintendent of compressor stations.

**Ralph I. Ellsworth,** senior petroleum geologist for American Republics Corp., at Houston, has been promoted to reservoir engineer. Other changes include: **G. D. Lightsey,** senior petroleum engineer at Silsbee, Tex., field, named senior petroleum engineer of the eastern division; **C. A. Shaid,** senior petroleum engineer, transferred from Joe's Lake, Tex., to Silsbee; **W. L. Williams,** junior petroleum engineer, promoted to senior petroleum engineer at Houston; **J. W. Chervenka,** senior petroleum engineer at San Angelo, Tex., transferred to Houston and promoted to reservoir engineer; and **John Chain,** junior petroleum engineer at Artesia, N. M., transferred to San Angelo and promoted to senior petroleum engineer.

**Dr. N. E. Rambush,** managing director and vice chairman of Power-Gas Corp., Ltd., London, has been elected chairman of the company, succeeding **Wilfred Beswick** who has retired. Dr. Rambush has been with the firm since 1918.

**Romeo E. Muller** has been elected executive vice president, general manager, and a director of Stanwood Oil Corp. Muller formerly was president of Panhandle Producing & Refining Co., resigning in January of this year. Stanwood, a producing company operated mainly in Pennsylvania, recently purchased Anderson Oil Co., which owned properties in Texas, Oklahoma, and other southwestern states.

**John Arnold Weideman,** petroleum engineer for Gulf Oil Corp., has been transferred from Goldsmith to Penwell, Tex.

**T. I. Larsen, Hugh Q. Buck,** and **B. F. Holland** have formed Lars Oil & Gas Co., Inc., Houston.

**G. W. Teer,** of Corpus Christi, Tex., has joined Directional Drilling Specialists as representative and chief engineer.

**W. C. Dahlman** has been transferred from Beeville to El Campo, Tex., as manager of Houston Natural Gas Corp.'s office. **Jack A. Bond** has been moved from Wharton, Tex., to Beeville to replace Dahlman.

**Lyle H. Hardy,** geologist, and **Frank O. Pryor, Jr.,** petroleum engineer, have been transferred from Houston to New Orleans for **John W. Mecom,** independent operator.

**A. D. Parker** has been transferred to the new Midland, Tex., office of Keating Drilling Co. as general superintendent.

**John Haworth,** of The Texas Co., has been elected president of the eastern section of the American Association of Petroleum Geologists. He succeeds **B. O. Winkler,** of Standard-Vacuum Oil Co. Other new officers, elected at the section's recent meeting in New York, are **Robert E. King,** Texaco, vice president; **Carroll Cook,** Standard Oil Co. (N.J.) treasurer; and **M. P. Yackel,** Arabian American Oil Co., secretary.

# PERSONALS

**Leo H. Muir** has been appointed to direct geological investigations for Oceanic Oil Co. in the coastal province of California. For the past 7 years he has been coastal district geologist for Wilshire Oil Co.

**Joseph J. Lawnick,** junior exploitation engineer for Shell Oil Co. at Lake Charles, La., has been transferred to the technical services group at Houston.

**Byron L. Plumley,** formerly petroleum engineer for Samedan Oil Co. at Ardmore, Okla., has joined Sinclair Oil & Refining Co. at Nowata, Okla., as petroleum engineer.

**Joseph Neely,** district geologist for Magnolia Petroleum Co., has been transferred from Shreveport to Tyler, Tex., in the same capacity.

**Albert W. Protiva,** assistant district superintendent for Sinclair Pipe Line Co. at Wichita, has been transferred to Shawnee, Okla., in the same capacity.

**Charles C. Bates,** consultant with A. H. Glenn & Associates, meteorological and oceanographic consultants, has been transferred from Washington, D. C., to College Station, Tex., where he will work towards a Ph.D. degree in geological oceanography.

**B. L. Jones,** assistant district superintendent for Humble Oil & Refining Co., has been transferred from Talco to Overton, Tex., in the same capacity.

**Ralph W. Vertrees,** formerly a student at University of Texas, has joined Continental Oil Co. at Big Springs, Tex., as petroleum engineer.

**Dana M. Secor,** head of the geological-research department of Atlantic Refining Co.'s Midland, Tex., division headquarters, has resigned to become a consulting geologist.

**Robert K. Young,** seismograph party chief for Continental Oil Co., has been transferred from Waurika, Okla., to Duncan, Okla.

**Rowland C. Barton,** junior petroleum engineer for Humble Oil & Refining Co., has been transferred from Hawkins to Tyler, Tex., and promoted to associate petroleum engineer.

**Howard M. Joiner** has been appointed chief mechanical engineer of Peoples Natural Gas Co., and **Robert S. Jefferies** has been named to serve in the same capacity for New York State Natural Gas Corp. Joiner will have charge of Peoples' numerous compressor installations in western Pennsylvania, and Jefferies will direct New York State's compressor installations in Pennsylvania and New York.

**J. B. Means,** district geologist for Skelly Oil Co. at Corpus Christi, has joined Midstates Oil Corp. at San Antonio as district geologist. A graduate of University of Texas, Means was employed by Tide Water Associated Oil Co. from 1941-47, and by Skelly from 1947-51.

**T. J. Nowak,** research engineer for Union Oil Co. of California at Wilmington, Calif., has been transferred to Brea, Calif.

**Chris B. Hubbard,** petroleum engineer for Humble Oil & Refining Co., has been transferred from Houston to New Orleans.

**J. H. Lang,** general superintendent of the pipe-line department for Ohio Fuel Gas Co., has been named to the

*J. H. LANG*

*G. S. BEITLER*

newly created post of assistant manager of the transmission division. **G. S. Beitler,** who has been superintendent of the pipe-line department, succeeds Lang as superintendent. Both men will be headquartered in Columbus, Ohio.

**Harry McDaniel** has been appointed superintendent of Cities Service Gas Co.'s compressor station at Knobnoster, Mo., in addition to his duties as pipe-line superintendent. **George Crane** has been transferred from Knobnoster to Pierce City, Mo., as superintendent of the compressor station there.

**C. E. Rawlins** has been made manager of the test division for Phillips Petroleum Co. at Bartlesville, Okla. He replaces **M. E. Holmberg** who has resigned to join a consulting-engineering firm. Rawlins has been with Phillips since 1937, and has been in the test division since 1940. **M. A. Patrick** has been made assistant manager of the construction division and will be responsible for all field-construction work of the engineering department. **L. L. Kasparek** has been promoted from project engineer to assistant manager of the construction division with headquarters at Bartlesville.

**John W. Hawkins,** engineer for Service Pipe Line Co. at Tulsa, has been promoted to planning engineer.

**C. A. Pollard** has been appointed general manager of Standard Oil Co. of California's El Segundo, Calif., refinery. He succeeds **E. E. Lyder,** who retired after 26 years with the firm. Pollard has been assistant general manager of the refinery at Richmond, Calif., since 1940. He first joined the firm in 1916 as an oil-field roustabout in southern California. In 1919 he returned to University of California and was graduated in 1921, when he resumed his job with the company. **C. W. Rehfuss,** formerly manager of operations, has been named to take Pollard's position at Richmond. He has been with the firm since 1924.

*C. A. POLLARD*

**R. W. Phillips** has been promoted from assistant to chief engineer in the engineering division of Kaw Pipe Line Co. and Texas-Empire Pipe Line Co. D. B. Good has been named assistant chief engineer.

**W. O. Ham, Jr.,** assistant division geologist at Midland, Tex., has been transferred to Fort Worth as area geologist for Continental Oil Co. He succeeds **W. Baxter Boyd** who resigned recently to join Republic Natural Gas Co. as chief geologist.

**Robert A. Harris,** formerly with Atlantic Refining Co. at Shreveport, has joined Globe Oil & Refining Co. at its Oklahoma City office.

**Raymond T. Joyce** has been appointed manager of operations for Brooks Oil Co., Cleveland and Pittsburgh. He joined the firm in 1934, was named purchasing agent in 1940, and was elected secretary of the company in 1946.

**E. R. Osburn,** assistant general manager of Texas Pipe Line Co. and Texas-New Mexico Pipe Line Co., has retired from service because of physical disability. Other personnel shifts include: **L. F. Scherer,** advanced from chief engineer to assistant general manager in charge of construction and engineering of both firms; **R. B. Trow,** promoted from assistant chief engineer to chief engineer of the two firms; **R. W. Olbrich,** moved up from special-projects engineer to acting assistant chief engineer; **C. H. Albitz,** promoted from division manager of the oil-traffic division, to assistant

# PERSONALS

general manager; and **W. C. Montgomery**, advanced from assistant division manager to division manager of the oil-traffic division of both companies.

**R. G. Scott**, production engineer for Sinclair Oil & Gas Co., has been transferred from Cleveland, Okla., to Olney, Tex.

**Bill J. Graham**, engineer for Sohio Petroleum Co., has been transferred from Holyrood, Kans., to Pauls Valley, Okla.

**Jack Davis**, geologist for Continental Oil Co., has been transferred from Morgan City, La., to Houston.

**R. D. Curtis**, director and vice president of production for Murphy Corp. at El Dorado, Ark., is on leave of absence with the production division of the Petroleum Administration for Defense in Washington.

**C. T. Rankin**, seismic-party chief with Amerada Petroleum Corp. at Shawnee, Okla., has been transferred to Glasgow, Mont., in the same capacity.

**P. T. Martin**, formerly field manager for Hancock Oil Co., Long Beach, Calif., has been appointed production manager. His field of operations will include the firm's new interests in Wyoming and North Dakota as well as those in California. **H. F. Dangberg**, chief petroleum engineer for the past 6 years, succeeds Martin as field manager. **M. J. McDonald** has been advanced to drilling superintendent for Hancock, after serving 5 years as drilling foreman.

**A. F. Turman** has been appointed assistant chief petroleum engineer for Standard Oil Co. of California in its San Francisco offices, succeeding **J. H. Menke** who recently retired after 35 years' service with the firm. **M. Putnam** has been appointed to Turman's former position, but **J. T. Crocker** will temporarily fill the post until Putnam completes a special assignment.

**E. M. Paulk**, resident engineer for Texas-Illinois Natural Gas Pipeline Co., has been transferred from Nacogdoches, Tex., to Poplar Bluff, Mo., in the same capacity.

**W. A. Waldschmidt** has resigned from Argo Oil Corp. at Midland, Tex., after 6 years of association. He is a past president and vice president of the West Texas Geological Society, and is currently district representative of the American Association of Petroleum Geologists for the southern Permian basin area. Waldschmidt will stay in the oil business in Midland.

**Dr. Fraser H. Allen**, senior petroleum engineer at Houston for Stanolind Oil & Gas Co., has been transferred to Corpus Christi, Tex., and promoted to district engineer.

**Joe L. Moore**, Midland, Tex., has resigned from Honolulu Oil Corp. to become a consulting geologist.

**A. J. Long** has been appointed assistant manager of production for Ohio Fuel Gas Co. at Columbus.

**J. W. Roe** has been appointed field superintendent of the new area office established in Riverton, Wyo., for Stanolind Oil & Gas Co. **J. M. Tripp** has been named field clerk, and **B. L. Howard**, field engineer.

**Clarence E. Booz, Jr.**, has been appointed head of the safety unit of Gulf Oil Corp. He will be responsible for planning and coordinating the company's safety and accident-prevention programs. Booz joined Gulf in 1928 and since 1940 had been safety director of the firm's three Texas refineries.

**E. P. Merritt, Jr.**, engineer for Phillips Petroleum Co., has been transferred from Phillips, Tex., to Harrisburg in the same capacity.

**W. O. Crain** has been named general counsel for United Gas Co., Shreveport.

**Rawleigh Warner, Jr.**, assistant to the president of Continental Oil Co., has been elected assistant treasurer of the firm.

**Robert C. Steves** has been named assistant director of the program division of the Petroleum Administration for Defense, succeeding **Robert N. Sears**, who has resigned.

**Earle M. Craig**, president of Freedom-Valvoline Oil Co., an affiliate of Ashland Oil & Refining Co., has been elected chairman of the board. **Everett F. Wells**, executive vice president of Ashland, has been elected Freedom-Valvoline president, and **Harry I. Johnston** has been elected to the new position of executive vice president.

**J. L. Lamberson, Jr.**, district petroleum engineer for Humble Oil & Refining Co., has been transferred from Sugarland to Tomball, Tex.

# DEATHS

**Dr. E. W. K. Andrau**, Houston geologist, was killed September 21 when his private plane crashed near Lake Charles, La. Born in the Dutch East Indies, Andrau came to the United States in 1929, and to Houston in 1931 as a geologist for Shell Oil Co. Later he left Shell and started independently as a consulting geologist.

**Albert E. Marshall**, 67, consulting chemical engineer and former president of the American Institute of Chemical Engineers, died September 15 in Providence, R. I. He was president of the association in 1934 and 1935, and a director from 1940 to 1943.

**C. A. Welsh**, 58, president and major stockholder of Welsh Oil Co., died September 12 in Michigan.

**Leslie D. Looney**, 60, former oil-conservation officer for the Oklahoma Corporation Commission, died at Oklahoma City September 17.

**Arthur C. Prince**, 73, director and major stockholder of Middle States Petroleum Co., died September 22 at his home in Chicago.

**Sol Sanders**, 47, oil-lease broker, died September 15 at Stamford, Tex.

**Luther E. Grissom**, 58, secretary and member of the board of directors of Humble Pipe Line Co., Houston, died September 15. He had been with the company since 1920.

**Allen S. Kellerman**, 21, and **George W. Canipe**, 29, both in the marine division of Humble Oil & Refining Co., were killed in an automobile accident near Dickinson, Tex., on September 21.

**Dr. D. R. Brown**, 65, president of Research, Inc., died at Coffeyville, Kans., September 19.

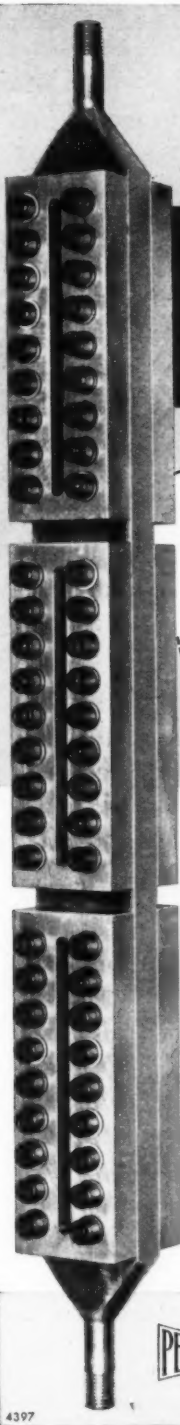
**James S. Routt**, 63, veteran oil lease broker, died at Okmulgee, Okla., September 23.

**James H. Kepner**, 67, early day oil-well driller, died September 22 in Tulsa.

**J. V. Morrissey**, 61, oil operator, died September 15 at Fort Worth, Tex.

**Milton S. Shieler**, 76, formerly with Continental Oil Co., died September 20 at Albuquerque, N. M.

**V. L. Blanchard**, 63, independent oil operator, Houston, died September 16.



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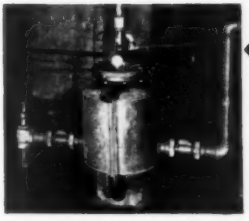

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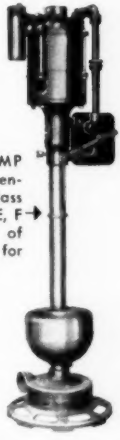

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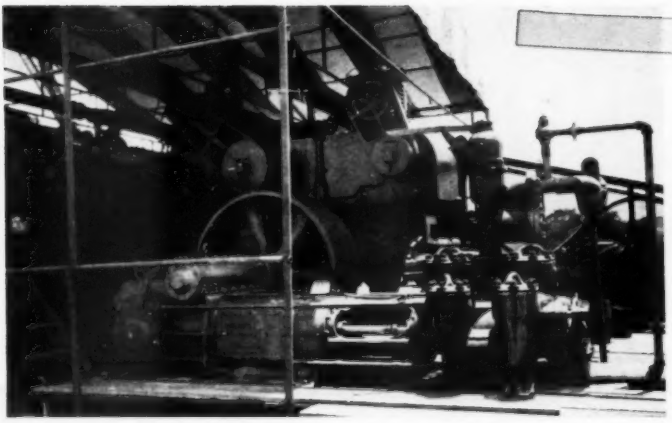
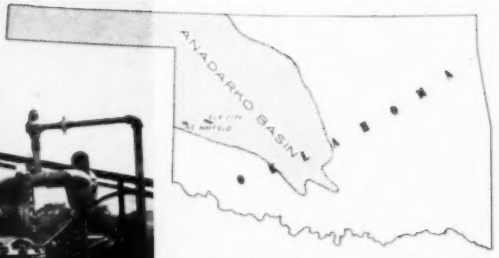


View from compound side of rig of Big Chief Drilling Co. which has been in operation at Elk City since 1948 and never torn down. Best rotating time to 10,500 ft. for this rig is 38 days.




Location of Elk City and Northeast Mayfield pools.

# Making Hole Through Thick Conglomerate

**by Joseph A. Kornfeld**
Mid-Continent District Editor

Good rates of penetration through hard, thick sections of conglomerate are being obtained by Elk City operators through proper attention to weight on bit, selection of drill-collar bit program and correct rotating speed.

CLOSE attention by contractors and company engineers to optimum weights on bit, proper drill-collar program, and rotating speeds, coupled with heavy-duty power rigs enable satisfactory penetration rates through thick sections of Pennsylvanian conglomerate in Elk City and adjacent fields in southwestern Oklahoma. As a result, time on bottom was cut nearly one-half under original field experience and today 10,500-ft. holes are cut as rapidly as 38 days for actual work on bottom.

### Company Rig 19

At Elk City, Shell Oil Co. maintained a company rig in the field from November 1949 until August 1950.

Company drilling practices employed included drilling a 12¼ or 13¾-in. hole to a depth of about 3,100 ft.; a mixed string of 9⅝ and 8⅝-in. pipe was set at that depth to seal off water sands and salt formations. A 7⅞-in. hole was then drilled to total depth, about 10,000 ft., and 5½-in. casing is set.

Company Rig 19 is equipped with a string of 4½-in., 16.6-lb. drill pipe using Reed semiinternal flush-tool joints which are used to drill both the large and the 7⅞-in. holes. Drilling processes are summarized in Table 2.

**Cutting surface hole.**—While drilling 3,100 ft. of surface hole, 8-in.-o.d., 3-in.-i.d. 30-ft. drill collars with H-90 threads are used. The total drill-collar string, totaling 170 ft., weighs 25,000 lb. in air. Weight held on bit is limited to weight of drill collars because of danger of hole deviation when drill pipe is used for added weight. Rotary drill speeds in surface hole range from 120 to 160 r.p.m.

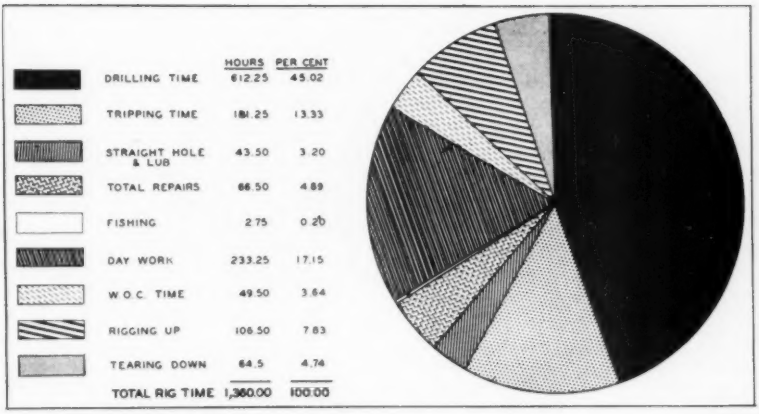
**Cutting deep hole.**—At 3,100 ft. the

**SURVEY OF DRILLING CONTRACTORS**

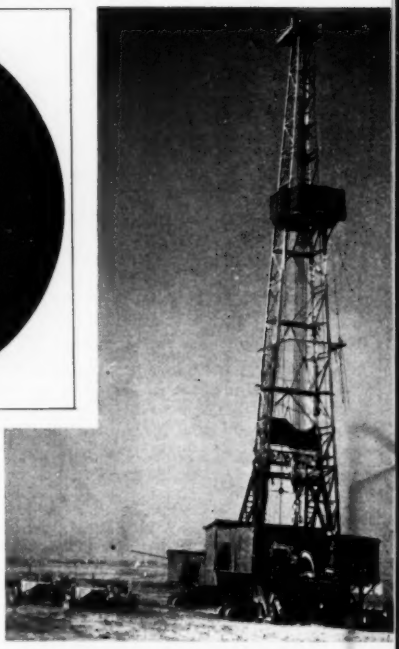
**(Elk City Field, Beckham and Washita Counties, Oklahoma. Status as of September 1, 1951)**

| Contractor— | No. rigs |
|---|---|
| Arrow Drilling Co., Tulsa | 1 |
| Big Chief Drilling Co., Tulsa | 3 |
| Decem Drilling Co., Oklahoma City | 2 |
| Falcon Seaboard Drilling Co., Oklahoma City | 2 |
| Helmerich & Payne, Inc., Tulsa | 4 |
| Olson Drilling Co., Tulsa | 3 |
| Parker Drilling Co., Tulsa | 1 |
| Readings & Bates, Inc., Tulsa | 2 |
| Williams-Copeland, Inc., Tulsa | 1 |
| Total | 19 |

Photograph of Hoxbar formation core showing conglomerate.


HOURS PER CENT
DRILLING TIME 612.25 45.02
TRIPPING TIME 181.25 13.33
STRAIGHT HOLE & LUB 43.50 3.20
TOTAL REPAIRS 66.50 4.89
FISHING 2.75 0.20
DAY WORK 233.25 17.15
W.O.C. TIME 49.50 3.64
RIGGING UP 106.50 7.83
TEARING DOWN 64.5 4.74
TOTAL RIG TIME 1,360.00 100.00

***PERFORMANCE.**—Distribution of total rig time by operations for Shell Oil Co. 4 Long, C SW NW 15-10n-21w, situated near center of field.*



***RIG 29**—Drilling performance evaluated by the adjoining pie chart refers to Rig. 29 of Big Chief Drilling Co.*

7⅞-in. hole is begun, using only 270 ft. of 6-in.-o.d., 2¼-in.-i.d. 45-ft. drill collars. Weight on bit is held to 20,000 to 22,000 lb. Rotary speed ranges from 90 to 180 r.p.m. These conditions are maintained to about 7,200 ft.

Rough drilling, due to logging streaks of anhydrite, limits the weight that can be carried on the bit in this interval because of imminent danger of losing cones.

At 7,200 ft. an additional 90 ft. of drill collars is picked up, raising total length of drill collars to 360 ft. Weight on bit is held to maximum of 30,000 psi., and rotary speed is 90 to 110 r.p.m.; however, for hard streaks, a slower table speed is sometimes used.

Ordinarily, total depth is reached with 360 ft. of drill collars; however, at times, logging of streaks of high hardness below 9,600 ft. necessitate picking up an additional 90 ft. of drill collars.

During September 1950, Shell brought a company rig back to Elk City and it is currently working at 5 Long, C NW SW 15-10n-21w. Equipped with Model 100 draw works, it is powered by three V-12 gas-powered drilling engines rated at 378 hp. maximum each while operating at 1,000 r.p.m.; these also drive two 18-in. mud pumps. The rig will evaluate drilling performance of an automatic weight control.

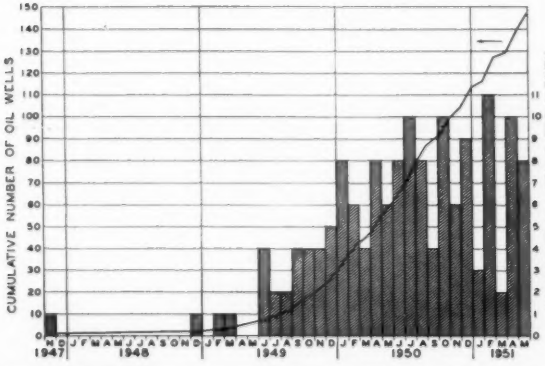
### Big Chief and Arrow Rigs

One of the popular rigs at Elk City is the JB-1250. Big Chief Drilling Co. has one of these rigs in operation and Arrow Drilling Co. has two working in this field. Eight wells have been drilled with this rig by Big Chief Drilling Co. and the rig was never torn down. Original cost was $350,000; however, at today's prices it would cost $425,000.

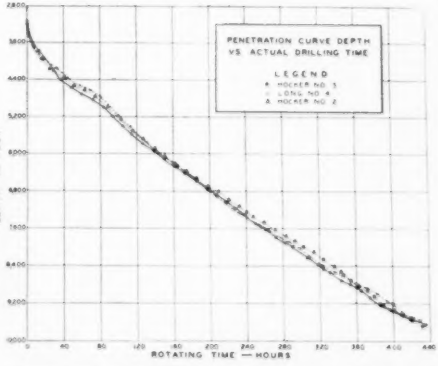
One skid job, covering 4½ miles, was made in a single day; much of the time was consumed waiting on high-line and telephone crews to move wires.

Drilling time was cut in half under the original time consumed back in 1948. Originally in 1948 it required 90 days, but today holes are cut to the 10,500-ft. contract depths in only 45 days. Best rotating time was 38 days and average rotating time was 48 days. Total in-and-out time varies from 60 to 70 days.

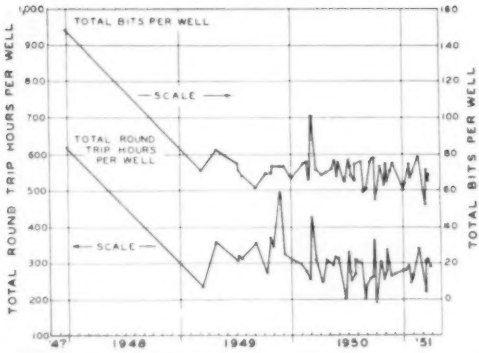
**Time on bottom.**—Average penetration rate for 10,210 ft. of hole cut at Shell Oil Co. 4 Long, C SW NW 15-10n-21w, was 16.69 ft. per hour. Driller A cut 3,565 ft. of hole in 207 hours


CUMULATIVE NUMBER OF OIL WELLS
NUMBER OF OIL WELLS PER MONTH
M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M
1947
1948
1949
1950
1951

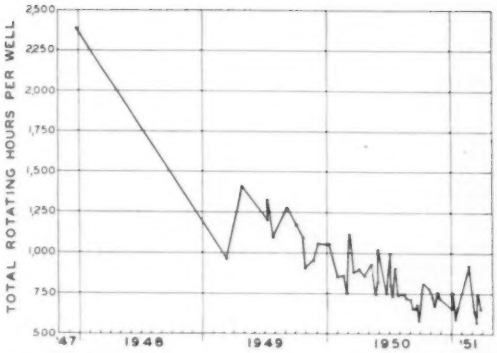
***DEVELOPMENT TREND.**—Time graph showing trend in number of oil wells completed each month and cumulative number of oil wells for Elk City from discovery to June 1951.*




***PENETRATION CURVES.**—Close agreement between the actual drilling time for three adjacent wells drilled in Elk City is shown in this graph.*




*COMPOSITE PERFORMANCE.—Drilling evaluation of 54 Elk City wells selected out of the first 98 wells shows constant improvement in total bits required and total round-trip hours per well.*




*TIME ON BOTTOM.—Progressive reduction in number of rotating hours per well is shown in an analysis of the same 54 Elk City wells from discovery to current date.*

on bottom for an average of 17.22 ft. per hour; Driller B cut 3,150 ft. of hole in 186.75 hours averaging 16.87 ft. per hour; while Driller C cut 3,495 ft. of hole in 218.5 hours averaging 15.98 ft. per hour. This well used four 12¼-in. bits; forty-seven 7⅞-in. bits, and one 4¾-in. bit; a total of 52 bits were used.

**Tripping time.**—Averaging tripping time for 4 Long was 2 hours. Driller A averaged 3 hours and 33 minutes; Driller B 3 hours and 53 minutes, while Driller C averaged 3 hours 5 minutes for tripping time.

This rig was the first on which a 142-ft. jackknife drilling mast was placed. It has a capacity of 830,000 lb. A.P.I. equivalent with a 21-ft. leg spread at base. Platform capacity is 9,720 ft. of 4½-in. drill pipe in the fingers of the right side and 5,940 ft. of 4½-in. drill pipe in the fingers of the left side for a total of 15,660 ft. full, or 13,410 ft. with clearance for casing. Mast is equipped with a 10-ft. high by 23-ft.-wide by 31-ft.-7⅝-in. length special mast substructure complete with mast foot ramps in front end to receive front legs of mast. Two sets of I-beams may be placed under the derrick-floor foundation and under engine foundation for moving with four Athey wagons.

### Straight-Hole Drilling

Falcon-Seaboard Drilling Co., using 4½-in.-o.d. drill pipe, starts with six drill collars at 200 ft. and keeps from six to nine collars on the string until a depth of 9,000 ft. is reached; at that depth three more collars are added. Bit weight is held at 25,000 lb. to 9,000 ft. at which depth bit weight is increased to 35,000 lb.

Big Chief Drilling Co., on Rig 26, found from experience that seven collars, weighing about 17,500 lb., are most effective from a performance standpoint down to 5,000 ft. On one occasion, crews started with 14 collars and as a result burst drilling cones.

After a depth of 7,000 ft. is passed, seven additional collars are added and carried to contract depth of about 10,500 ft. Total bit weight is held between 15,000 to 30,000 lb.

Shell requires contractors to run deviation survey every 500 ft. Maximum deviation encountered in drilling to 10,000 ft. has been 4°. Shell's 2 City of Elk City showed a deviation of 4° at about 8,200 ft., but this was corrected by sharply reducing bit weight.

**Draw works.**—Big Chief operates a JB-1250 draw works, powered by three LROU engines. Slush pumps are 8 by 20-in. power pumps. The TM-50-5 traveling block is grooved for 1¼-in. wire line. A 300-ton super triplex casing hook is used. Rotary table is KS 27½-in.

Arrow's Rig 17 is powered by three 420-hp. gas or butane engines. Slush pumps are one 8 by 20-in. and one 7¾ by 16-in. Derrick is 136-ft. 850,000-lb. load capacity with 30 by 30-ft. base with 7-ft. substructure of 1,000,000-lb. capacity. A 6,000-lb.-test blowout assembly is used. Three 8 by 32-ft. steel pits are set. Rig 18 is the same except that a 15,000-ft. sand reel is attached.

### Diamond-Coring Operations

Formation cored in Elk City field is the Hoxbar (Missouri) series of the Pennsylvanian system. Lithologically, the Missouri is predominantly granite wash interbedded with streaks of limestone and sandy limestone. The term granite wash, when applied to the Missouri at Elk City, comprises an arkose sand conglomerate, consisting of a poorly sorted matrix of subrounded to angular, medium to coarse quartz and feldspar fragments. In this matrix are pebbles of quartz, chert, and igneous material, which vary from buckshot to grapefruit. Degree of cementation of the conglomerate varies widely from loosely consolidated and porous sections to those which are well cemented and dense; the latter resembles a portion of rough concrete.

Shell Oil Co. conducted an extensive program of diamond coring on 33 wells in Elk City field as of January 1, 1951. To that date, a total of 3,819½ ft. of core was diamond cut with a total footage recovery of 3,594½ ft. which represents an average recovery of 94 per cent. For the period covered, an average of 116 ft. of formation per well has been cored; however, this figure has been reduced considerably from an average of 128 ft. per well during 1949 to 57 ft. per well during 1950. (See Table 3.) By 1951, coring had been eliminated.

A statistical breakdown of diamond-core recoveries appears in Table 4. These 33 wells are analyzed on a frequency distribution basis in two groups by wells and by footages in each group. In the 95 to 100 per cent group were 22 wells or 66.6 per cent of all wells representing 1,928½ ft. or 50.49 per cent of total footage cut.

The next grouping of 91 to 94 per cent represent four wells or 12.1 per cent of the wells for 1,262 ft. or 33.04 per cent of total footage cut. These two groups accounted for a combined total of 78.7 per cent of the wells cored and 83.53 per cent of the total footage.

### Drilling-Mud Program

**Conductor hole: (0-120 ft.).**—Fresh water clay is used to raise viscosity of mud in order to get the hole in condition to stand up.

**Salt string hole: (120 to 3,100 ft.).**—In drilling this section, it is advisable to increase mud viscosity to prevent circulation loss and abnormally high hole trouble expected when using water-base mud. Viscosity of 31 to 33 seconds A.P.I. is generally considered sufficient. From 6 to 8 hours prior to completing salt string hole, viscosity should be raised to give salt-water clay a chance to yield; viscosity of 45 to 50 seconds A.P.I. is sufficient to clean the hole. Loss of circulation sometimes occurs from 600 to 1,000 ft.

**Intermediate section: (3,000 to 6,000 ft.).**—After drilling out cement in casing, existing mud is jetted away and water is used. Ordinarily, 32 to 34 seconds-viscosity mud is employed; however, if hole trouble is encountered, viscosity is raised to 40 seconds. Salt-water clay is used to maintain viscosity throughout this section.

**Section from 6,000 ft. to 8,500 ft.**—Bentonite is used to maintain viscosity between 6,000 and 7,000 ft. Prior to using bentonite, the mud should be treated with soda ash to lower the calcium-ion concentration; salt content should be held to less than 1 per cent. Excess mud in system should be jetted away before adding soda ash. Circulation loss may be expected from 7,000 ft. to total depth, requiring that mud weight be held to 9.2 to 9.4 lb. per gal. Chemical treatment is started at about 6,500 ft.

**Section from 8,500 ft. to total depth.** The following properties are desired for this section:

| Property— | Before setting pipe | After setting pipe |
|---|---|---|
| Funnel vis. A.P.I. sec. | 43-45 | 40-45 |
| Water loss, cc./30 min. | 10 | 15 |
| Gel strength: gm./initially | 0 | 0 |
| Gel strength: gm./10 min. | 10-20 | 0-30 |
| Mud weight: lb./gal. | 9.2-9.4 | 9.2-9.4 |

### Drilling-Mud Storage

Savings in time and in mixing costs result from the use of central drilling mud storage facilities at Elk City. A battery of three low 500-bbl. tanks are maintained in the center of the field. Two high 500-bbl. reserve mud tanks are located on the west side. Regular 30-35-bbl.-capacity oil-field tank trucks are used to move mud to well.

Uses for central mud storage include mud availability for killing a high-pressure well, for correcting lost circulation, for handling a workover, and for the next job. From 12 to 24 hours is required before a yield is obtained from fresh mud; hence central mud storage offers time economies in this respect.

### Casing and Cementing Problems

Standard practice at Elk City calls for setting a conductor pipe of 16-in.

*(Continued on page 111)*

**TABLE 1—TYPICAL FORMATION MARKER SUMMARY**

(Elk City Field, Beckham and Washita Counties, Oklahoma)

Data: Shell Oil Co., Oklahoma City.

| Age and formation— | Sample tops, ft. Actual | Subsea |
|---|---|---|
| In Permian: | | |
| Base Blaine formation | 1,600 | ( 300) |
| Top Wellington formation | 3,600 | (—1,700) |
| Top Pontotoc conglomerate | 4,700 | (—2,800) |
| Top Penn.: | | |
| Top Missouri (Hoxbar) series | 7,900 | (—6,000) |
| Top Belle City limestone | 8,800 | (—6,900) |
| Top Des Moines series | 10,400 | (—8,500) |

**TABLE 2—SUMMARY OF DRILLING PRACTICE, SHELL OIL CO. RIG NO. 19, ELK CITY FIELD, BECKHAM AND WASHITA COUNTIES, OKLAHOMA**

| Depth range (ft.) | Hole size (in.) | Casing program: Size, o.d. (in.) | Casing program: Seat (ft.) | Drill collars: Collar length (ft.) | Drill collars: Total No. | Drill collars: Total footage | Drill collars: Sizes, in. o.d. | Drill collars: Sizes, in. i.d. | Wt. in air, 1,000 lb. | Wt. on bit, 1,000 lb. | Rotating speed, r.p.m. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-100 | | 16 | 100 | | | | | | | | |
| 100-3,100 | 13¾ | 9⅝ | *600 | 30 | 6 | 170 | 8 | 3 | 25 | 22-25 | 120-160 |
| | | 8⅝ | *2,500 | | | | | | | | |
| 3,100-7,200 | 7⅞ | | | 45 | 8 | 270 | 8 | 3 | 40 | 20-22 | 90-180 |
| 7,200-9,600 | 7⅞ | | | 45 | 10 | 360 | 6 | 2¼ | 53 | 30 | 90-110 |
| 9,600-T.D. | 7⅞ | 5½ | 10,300 | 45 | 12 | 450 | 6 | 2¼ | 66 | 30 | 90-110 |

*Mixed string; currently, Shell casing program on contract wells calls for setting 600 ft. of 9⅝-in. pipe and only 1,500 ft. of 8⅝-in. to conserve 1,000 ft. of 8⅝-in. casing per well in a pipe-conservation program.

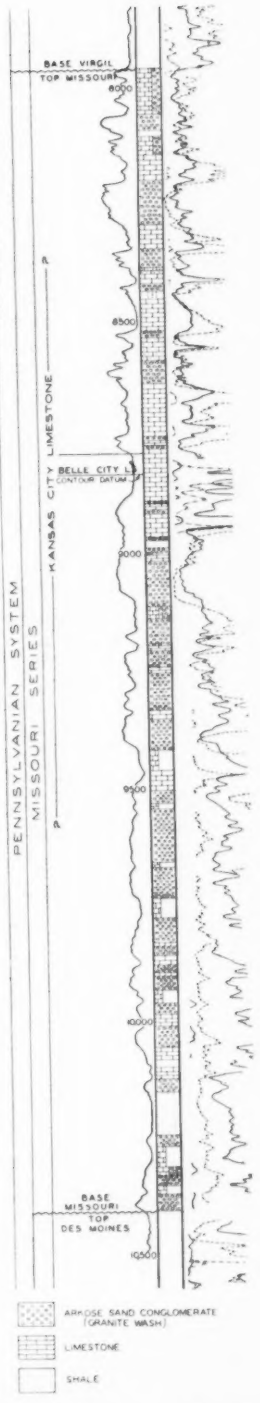
**TABLE 3—SUMMARY OF DIAMOND-CORING OPERATIONS, SHELL OIL CO., ELK CITY FIELD**

| Year | No. wells diamond cored | Avg. No. cores cut per well | No. cores cut | Avg. footage cored per well | Total footage cut | Total footage recovered | Recovery per cent |
|---|---|---|---|---|---|---|---|
| 1948 | 1 | 24.0 | 24 | 1,006 | 1,006 | 926 | 92 |
| 1949 | 14 | 3.4 | 47 | 128 | 1,790 | 1,678 | 94 |
| 1950 | 18 | 1.39 | 25 | 57 | 1,023½ | 990½ | 97 |
| Grand total | 33 | 2.9 | 96 | 116 | 3,819½ | 3,594½ | 94 |

**TABLE 4—FREQUENCY DISTRIBUTION OF DIAMOND-CORING RECOVERIES, SHELL OIL CO., ELK CITY FIELD**

(Period from January 1, 1948, to January 1, 1951)

| Recovery range per cent of core cut: | Diamond-cored wells in each group: No. wells | Per cent of total | Total footage cut in each group: Ft. | Per cent of total |
|---|---|---|---|---|
| 95-100 | 22 | 66.6 | 1,928½ | 50.49 |
| 91-94 | 4 | 12.1 | 1,262 | 33.04 |
| 85-90 | 2 | 9.1 | 85 | 2.23 |
| 80-84 | 2 | 6.1 | 373 | 9.76 |
| Below 80 | 2 | 6.1 | 171 | 4.48 |
| Total | 33 | 100.0 | 3,819½ | 100.00 |




*Hoxbar reservoir detail, Elk City.*

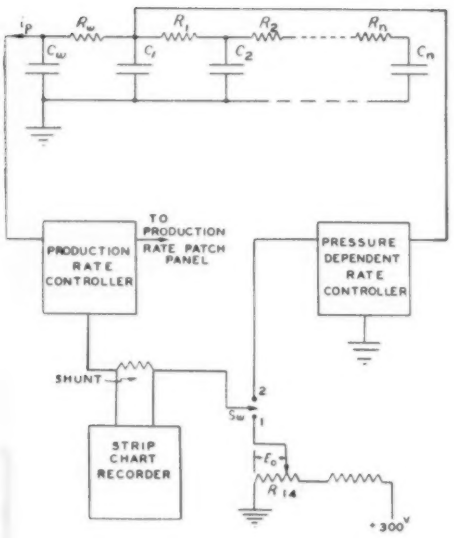



Fig. 1.

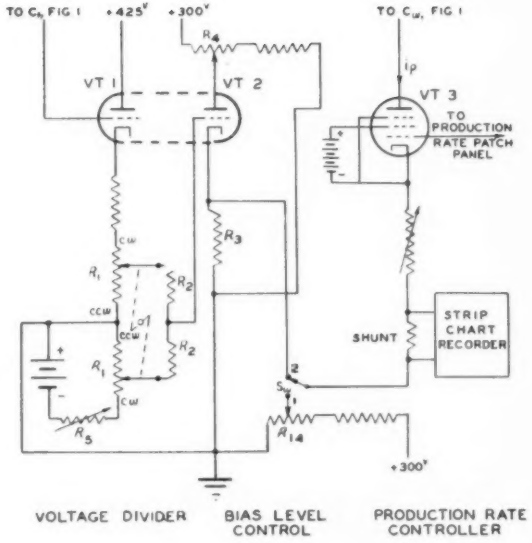



Fig. 3.

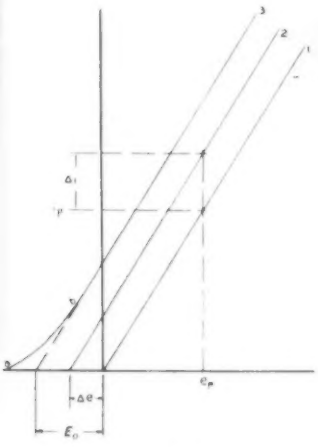



Fig. 2.

# A New Electrical Analyzer

## . . . for study of oil-field behavior

**by Robert G. Nisle***

**The electrical analyzer has been used for a number of years to predict future behavior of oil fields. This report tells how it can also be used to study behavior of gas fields.**

THE reservoir-behavior analyzer has been used for a number of years to study past behavior and predict behavior of undersaturated oil deposits, and through the use of the so-called "expansion unit" to study the behavior of saturated oil deposits either with, or without, a gas cap. The theory and operation of this device has been presented in the literature by various authors.[1,2,3] In essence the analyzer consists of an electrical network, which may take various forms.†

*Research division, Phillips Petroleum Co., Bartlesville, Okla.

†The electrical constants, resistance, R, and capacitance, C, are made proportional to the corresponding reservoir resistance, $R_f$, and reservoir capacitance, $C_f$. A current, i, is withdrawn from the network which is proportional to the fluid-withdrawal rate, q, in force at the particular time in the oil-pool history under study. The voltage on the network is then proportional to the average pressure in the reservoir. In order to establish the required relations between the analog and its prototype, the oil pool, it is necessary to make certain assumptions, such as the constancy of the fluid compressibility, and the linear dependence of density on pressure. These assumptions are discussed in the references previously cited.

The analyzer may also be used to study the behavior of gas fields under certain limiting conditions. It is the purpose of this paper to discuss the approximations which must be employed, the limiting conditions which apply, and the variations in procedure required when the analyzer is used to study gas-field behavior.

### Analyzer Use—Gas Fields

The validity of an analyzer study of a gas field depends on the fulfillment of three conditions.

1. The fluid must remain in a single phase, the gaseous phase in this case.
2. The equation defining the nature of the flow must be known.
3. The pressure variations must not be excessive.

Analyzer operation is based on the equation:

$$\gamma_o = A\, e^{cp} \qquad (1)$$

in which

$\gamma_o$ = density of the liquid (oil or water in this case)
c = compressibility
p = absolute pressure
e = base of the natural logarithms
A = a constant

The corresponding equation for a gas is:

$$\gamma_g = B\, P^m \qquad (2)$$

in which

$\gamma_g$ = gas density
P = absolute pressure

# "I have confidence in REED Rock Bits"

## ...says J. D. Clayton, driller for Frank Wood Associates, Inc., in Wichita Falls area

**REED**
*Liquid-blast*
**ROCK BITS**

Mr. Clayton added, "I like to use equipment I can depend on because it keeps me out of trouble and helps me do a good job.

"I can depend on **REED** Liquid-Blast Rock Bits to give good long runs."

FOR GOOD LONG RUNS USE THE **REED 'LB'**

This is the TST-1 Rock Bit shown on the drill collar at the right.

**REED** Liquid-Blast Rock Bits give long runs and fast penetration because jets of drilling fluid clean the bottom of the hole. Clean cutters are always drilling new formation.

**REED ROLLER BIT COMPANY**

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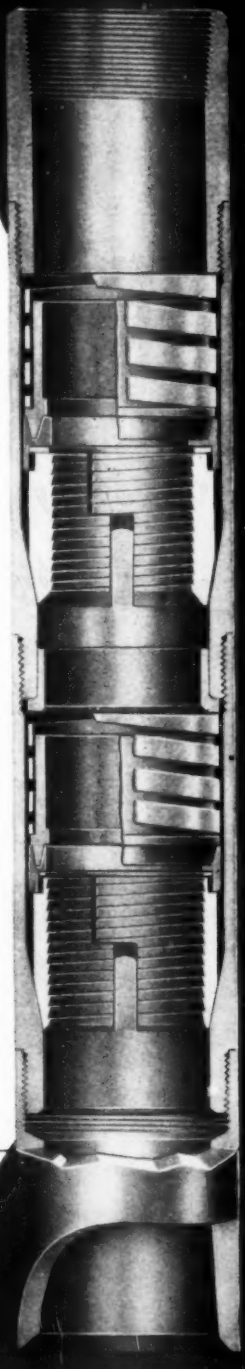

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m = a constant depending on the nature of the flow (m = 1 for isothermal flow)

B = a constant

If isothermal, nonturbulent flow is assumed, and if the average pressure and density of the gas in the reservoir are such that the ideal gas laws may be assumed to be valid, then the constants in Equation 1 may be chosen such that $\gamma_a$ approximates the $\gamma_x$ defined in Equation 2. In order to do this the density of the reservoir gas at some pressure must be known, or as is usually the case, the specific gravity of the gas relative to air at standard conditions of temperature and pressure must be known. From this information the constant B in Equation 2 may be evaluated at the reservoir temperature. Two points ($\gamma_1$, $P_1$) and ($\gamma_2$, $P_2$) calculated from Equation 2 may then be used to evaluate the constants in Equation 1. The error in $\gamma_x$ resulting from the use of Equation 1 rather than Equation 2 should then be checked for the pressure range of interest, either by direct calculation, or more simply, by a visual inspection of the graphs of Equations 1 and 2. The constant, A in Equation 1 as thus determined, may now be used in the usual equations for calculating the electrical network parameters, $R_a$ and $C_a$.

Since it is usual to express gas production rates in terms of cubic feet per day at standard conditions of temperature and pressure (60° F., 14.696 psia.), it becomes necessary to convert withdrawal rates to reservoir conditions of temperature, $T_R$ and pressure $P_R$. The temperature conversion may be taken care of by incorporating it into the equations for the network parameters, $R_a$ and $C_a$.

The pressure conversion presents a different problem. Since the usual production practice is to attempt to maintain the production rate constant in terms of standard cubic feet per day, and since the standard pressure is a constant, then the product, $Q_sP_s$, must be constant. It has been assumed that the ideal gas laws apply, therefore, we may write:

$$Q_sP_s = Q_RP_R \qquad (3)$$

in which

$Q_s$ = production rate in standard cubic feet per day

$P_s$ = standard pressure (14.696 psia.)

$Q_R$ = reservoir production rate (flow into the well bore)

$P_R$ = reservoir pressure (in the immediate vicinity of the well bore)

By virtue of Equation 3, the product $Q_RP_R$ must remain constant. But, $P_R$ decreases as the gas field is produced. Therefore, $Q_R$ must increase if $Q_RP_R$ is to remain constant. This condition may be established by a stepwise adjustment of the production rate controls on the analyzer. The proper magnitude of the production rate increases and the times at which these increases are to be made must be determined by cut-and-try methods. If these production rate increases could be controlled automatically by the pressure decline, much of the error in the former method could be eliminated, and a large amount of time could be saved. A circuit for accomplishing this has been devised and incorporated into the analyzer. The remainder of this article will be devoted to a description of this addition to the analyzer and an explanation of its operation.

### Description of the Pressure Dependent Production Rate Controller

Since $Q_R$ is to vary as a function of $P_R$, a control voltage must be derived from the voltage on the pool unit. Further, whatever means is employed, it must require a negligible current drain at whatever point it is connected. A cathode follower is ideally suited for this.

As for the present production-rate controller, its current may be varied by changing the grid voltage, the cathode bias, or the screen voltage. The first and last methods are ruled out by the fact that the current must increase rather than decrease as the voltage decreases, unless additional circuits are provided to reverse the polarity of the reservoir voltage change. The variation of cathode bias has, therefore, been employed though it has certain limitations to be discussed later.

The operation of the unit is as follows: In normal operation, the switch, SW (Fig. 1) is in position 1, and the idealized operating curve of $e_r$ versus $i_p$ is curve 1 in Fig. 2. The curved part, ab, of the vacuum tube characteristic (curve 3, Fig. 2) is straightened out by adjusting the resistors on the production-rate divider patch panel and it is caused to pass through zero by the use of a fixed cathode bias, Eo, set on $R_{14}$. Here $e_r$ is a voltage proportional to production rate. With the switch, SW, in position 2 the pressure dependent rate controller is adjusted to provide the same cathode bias as that supplied by $R_{14}$. The bias then decreases as the pool voltage decreases and thus reduces Eo by $\Delta e$. Curve 1, Fig. 2, is thus shifted by $\Delta e$ to curve 2. The current, $i_p$, proportional to the production rate, is thus increased by $\Delta i$, since $e_r$ is constant. The bias variation, $\Delta e$, resulting from a change in reservoir voltage (pressure) is limited by the value of Eo.

Therefore, the unit cannot be used when the reservoir pressure decline is excessive. This point is reached when the reservoir voltage (pressure) drops by more than 70 per cent of its initial value. In such cases, a change in the pressure-voltage proportionality constant may be used to extend the range of operation.

Fig. 3 is a schematic of the pressure dependent rate controller. VT1 is one section of a dual triode (6SN7). It operates as a cathode follower and its function is to provide a means for taking a fraction of the pool unit voltage variation without introducing any appreciable leakage at its point of connection. In order to balance out the undesirable voltage drop in the cathode resistor arising from the static plate current, an auxiliary battery, a potentiometer and variable resistor are used to provide a voltage of magnitude equal to this static voltage and of opposite sign.

The two potentiometers, $R_1$, $R_1$, and the pair of equal resistors, $R_3$, $R_3$, constitute a bridge circuit such that when the voltages at the opposite ends of the $R_1$'s are equal in magnitude, the grid of VT2 will be at ground potential regardless of the position of the sliders on the $R_1$'s. When the reservoir voltage drops, the voltage on the cathode of VT1 will drop by approximately a like amount. The voltages at the opposite ends of the $R_1$'s will no longer be equal and the voltage on the grid of VT2 will drop an amount dependent on the positions of the sliders on the $R_1$'s.

VT2 is also connected as a cathode follower and one of its functions is to provide a bias voltage Eo (Fig. 2) equal to that provided by $R_{14}$. When the grid is at ground potential, the current through $R_5$ will be determined by the value of $R_4$, the characteristics of VT2, and the voltage on the plate of VT2. This current, and hence the voltage across $R_5$, may, therefore, be controlled by changing the plate voltage applied to VT2. By this means, a bias voltage, Eo, equal to that provided by $R_{14}$, is obtained. When the voltage on the grid of VT2 is reduced as described in the previous paragraph, the cathode voltage decreases by an amount $\Delta e$. The resulting bias on VT3 is then Eo — $\Delta e$ and the production current is increased as previously described and illustrated in Fig. 2.

**Procedure.**—Operation detail for using the unit is as follows:

*(Continued on page 98)*

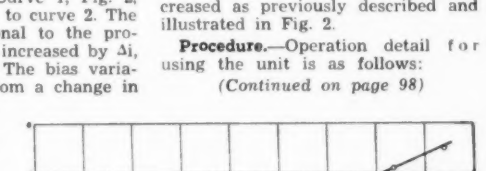


*Fig. 4.*

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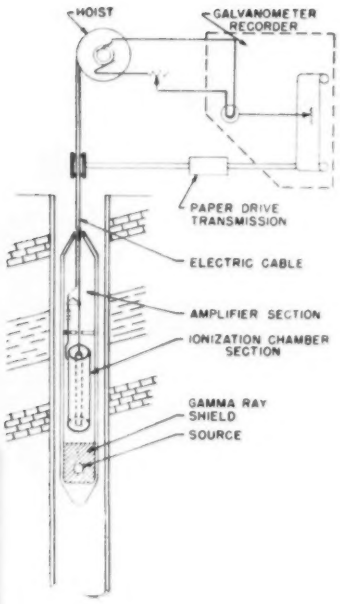


*Fig. 1—Schematic arrangement of apparatus for performing neutron well logging.*

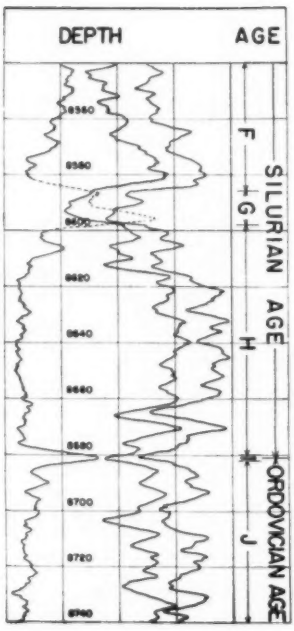


*Fig. 2—Gamma-ray and duplicated neutron curves for a well in Ector County, Texas.*

Here's a report on how the industry is finding uses for a new tool. You'll be hearing more on

# RADIOISOTOPES

**by Paul H. Emmett***

**The various proposed uses that have been summarized here for radioactive isotopes in the petroleum industry, in exploration, in drilling, in refining, in the distribution and testing of products, and in chemical research, must be considered as representative of some of the dividends we can receive from the atomic age we are now entering. It seems safe to predict that such isotopes will be used with an increasing frequency in the future and that they will be able to contribute greatly to the progress that the petroleum industry is making in striving to better serve the public.**

DURING the 5 years in which radioactive isotopes have been available in large quantities, numerous applications have been found for them in the petroleum industry. It seems very likely, however, that these applications represent only a beginning. The present summary of uses for radioactive isotopes is being written in the hope that it will help to stimulate further research in the field by calling this new and useful tool to the attention of those interested in the production and distribution of petroleum products.

The uses that have been made of radioactive isotopes in the petroleum industry appear to fall rather logically into three distinct classifications relating respectively to (1) exploration and production of petroleum, (2) refining and distribution of petroleum products, and (3) chemical research as applied to process development or improvement of petroleum products. It will be convenient, therefore, to discuss the numerous applications under these three headings.

*Senior Fellow, Mellon Institute of Industrial Research, University of Pittsburgh. Contribution from the Multiple Fellowship of Gulf Research & Development Co., Mellon Institute, Pittsburgh.

### Tracers in Petroleum Production

**Well logging.**—During the last half century, many new tools and approaches have been introduced into petroleum exploration. One group of such tools can be described under the general title of well logging. For a number of years one form of well logging has involved the measurement of the natural radioactivity of the deposits surrounding an oil well as a function of depth of the oil well. In making such measurements in the past, it has been customary to lower a Geiger counter or a suitable ionization chamber down a well and to measure accurately the amount of radiation present as a function of distance from the surface. Such a gamma-ray logging curve,[1,2,3] by locating the radioactive portions of the well, can give considerable information in regard to the nature of the strata through which the well has been drilled. Recently, it has been found possible to supplement this information by making what is now called a "neutron log" of a drilled well.

The equipment and procedure used in neutron logging are illustrated in Fig. 1, taken from a paper by Fearon.[4] The apparatus used for counting and recording radiation has buried in its tip a suitable source of neutrons such as the radium-beryllium mixtures that are commonly used. The emitted neutrons penetrate the casing of the well and activate atoms in the surrounding strata to such a point that these materials give off radiation that can be measured by the counter. The intensity of this radiation is closely related to the nature of the surrounding material in the various strata through which the well has been drilled.

In particular, the neutron curves are capable of indicating those regions in which a fairly high concentration of hydrogen exists. Unfortunately, the neutron logs do not differentiate between hydrogen that may be present as petroleum products and hydrogen that may be present as water. Nevertheless, it is generally believed that such neutron logs[5,6] may provide very useful information[7] and certainly will help to supplement the gamma-ray and electric logs[8,9,10,11,12] that are customarily made of wells.

In Fig. 2 is shown a typical set of curves obtained by gamma-ray well logging and by neutron well-logging procedures and published by Fearon.[4] The curve to the left is the gamma ray well-logging curve and represents a plot of radiation intensity increasing to the right on the abscissa with the increase in intensity in radiation as a function of the distance from the surface. The two curves to the right represent independent check neutron curves that were made of the same well.

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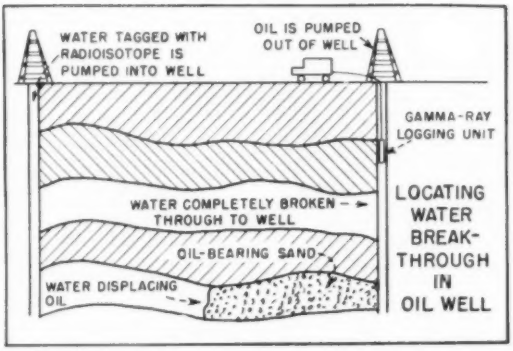
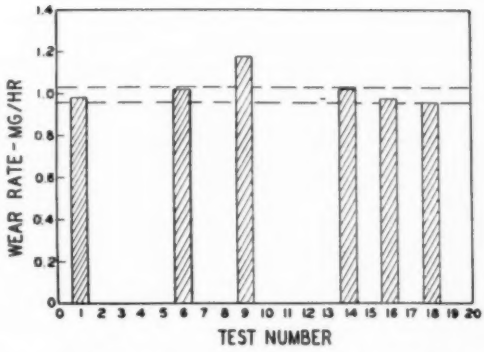
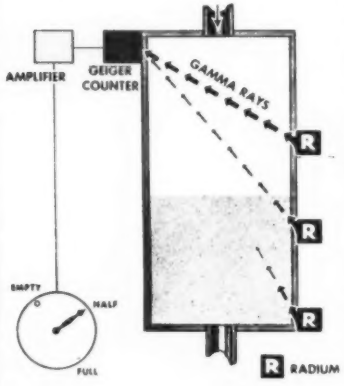

WATER TAGGED WITH RADIOISOTOPE IS PUMPED INTO WELL
OIL IS PUMPED OUT OF WELL
GAMMA-RAY LOGGING UNIT
WATER COMPLETELY BROKEN THROUGH TO WELL
OIL-BEARING SAND
WATER DISPLACING OIL
LOCATING WATER BREAK-THROUGH IN OIL WELL




*Above: Fig. 3—Suggested application of radioactive isotopes in water-flooding operations.[1] Below: Fig. 4—Diagrammatic arrangement of principal components in system for determining catalysts-bed levels in Sun Oil Co.'s new Houdriflow unit operations.[2] Above, right: Fig. 5—Reproducibility of piston wear rates as measured in using radioactive piston rings.[3]*




ready called attention to a great many potential uses of radioisotopes in the petroleum industry as well as in other industries. In Fig. 3, for example, is an illustration of a suggested use that he proposed in connection with water flooding. He pointed out that in modern flooding operations in which water is forced down one well in an endeavor to displace oil into an adjacent well, one frequently finds the water breaking through side channels and bypassing the supply of oil that one is trying to force to the surface.

Schreiber suggests that it would be possible to add a tracer to the water that is being used for flooding operations in such a way that one could instantly detect the penetration of such water into the oil well and could, at the same time, by means of a Geiger counter lowered down the oil well, locate the particular point at which said water was breaking through and bypassing the supply of oil. This would enable the operators to cement off the particular passage through which the flooding water was escaping, and thus increase the efficiency of the flooding operation.

The suggestion by Schreiber seems to be a reasonable one. However, it may not be easy to select a suitable radioisotope for such an operation. As pointed out by Breston,[4] numerous complications will arise, including the extreme dilution that would be involved, the base exchange with ions in the mineral formations, and the physical adsorption of the isotope on the porous rocks. Care would also have to be used to employ an isotope free of health hazards to the workmen, to the users of the petroleum products, and to those drinking fresh water from supplies that might be contaminated with any of the flooding water.

Closely related to the use of tracers in flooding operations is the addition of finely divided radioactive cobalt to the water in a well as a means of obtaining an injectivity index of the well as described by Bird.[5] The finely divided cobalt is filtered out "on the face of the sand leaving a microscopic radioactive filter cake where the water enters the sand. The amount of radioactivity filtered out is proporticnal to the amount of water that enters the sand at that particular depth." The measurement of the radioactivity as a function of depth in the well yields information that "is of considerable value in shooting a well to obtain an even flood front."

**Exploration and drilling.** — Among the more valuable uses that have so far been found for radioisotopes in these petroleum operations is their use as markers[6] for certain operations connected with the drilling and operation of a well. For example, it is a common practice to mark permanently certain points in the well after an original electric well-logging procedure by firing radioactive bullets into the strata surrounding the well. These can easily be located exactly with a Geiger counter and therefore serve as permanent markers. The bullets can be located even after a casing is put in the well, since they contain radioisotopes having radiation that is sufficiently strong to penetrate the casing and to be picked up by the Geiger counter in the core of the well.

**Cementing.**—Another common use for radioactive isotopes in drilling is in tagging this operation. Teplitz and Hassebrock[7] have called attention to the use of carnotite in cement used in squeeze-cementing operations. Fearon[8] has suggested possible advantages in using selected isotopes that are capable of marking the cement for definite lengths of time.

**Core study.**—Finally, it should be pointed out that several papers have suggested the possibility of using radioactive materials in laboratory experiments for investigating the flow of oil or oil-water mixtures through actual cores taken from various typical soil strata. Thus, Russell, Morgan, and Muskat[9] have used a radioactive isotope of vanadium dissolved in water to follow the movement of interstitial water in sandstone cores and thereby obtain information as to the relative efficiency of oil and water in displacing interstitial water in naturally occurring earth formations. In a somewhat similar series of experiments, Coomber and Tiratsoo[20, 21] have followed the movement of oil through sand by using radioactive iodine as a tracer.

### Radioisotopes in Refining and Pipe Line Transportation

In refining processes, the principal application of radioactive materials has been in gages for measuring the

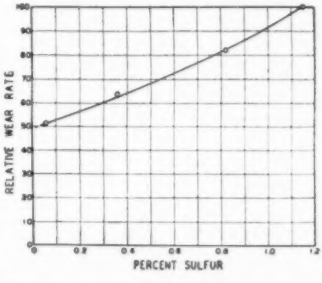



*Fig. 6—Relation between piston wear and per cent fuel sulfur as measured in 1 day by employing radioactive piston rings.[3]*

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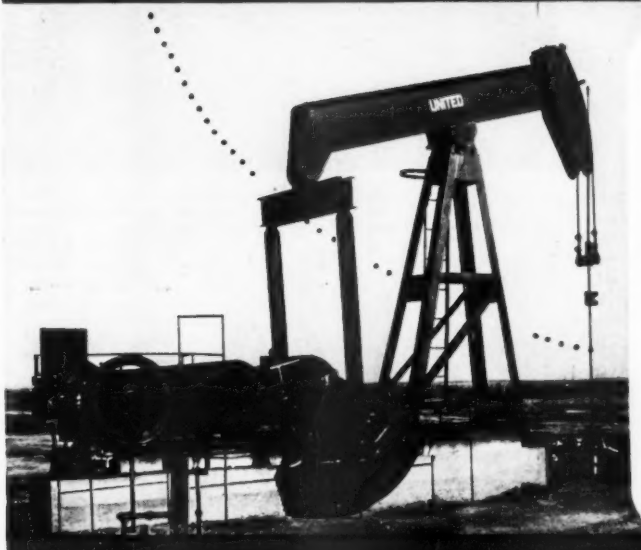


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height of solid or liquid materials in tanks or reactors.[22,23,24,25,26,27] Sun Oil Co., for example, is measuring the height of the catalyst bed in a Houdry flow unit by an arrangement illustrated in Fig. 4. One further use of radioactive materials in refining processes that should be mentioned in passing is their employment in standard radiographic work to detect flaws,[28] corrosion, deposits of sediment, and other irregularities in equipment.

**Product testing.**—Two important applications of radioisotopes have been suggested for this purpose. One of these involves the use of radioactive piston rings for speeding up tests on engine wear.[29] Fig. 5, taken from a paper by Pinotti, Hull and McLaughlin,[30] shows the reproducibility of the values for wear rates taken in six successive experiments using the radioactive-piston-ring technique. The authors point out that the single experiment shown in this figure which does not conform too well with the other five was influenced by a deviation in the operating test conditions.

The advantages of using the radioactive piston rings to detect engine wear rapidly is further illustrated by some of their results obtained in a series of experimental tests made during a single day (Fig. 6). Comparable tests using ordinary methods for detecting wear would have required much longer periods of time.

**Product lines.**—A second important and striking use of radioisotopes has been made by Hull and coworkers and is concerned with marking the dividing point between two liquids that are being transported in succession through a given pipe line. Hull, Kent, and Lee[31] have shown that by using a suitable organic compound containing radioactive barium, it is possible to put a radioactive indicator between the two portions of liquid being passed through a given pipe and thus enable the operator to determine quickly with a Geiger counter when the passage of the first liquid has been completed and the second liquid is starting. Clearly, this is a very useful possible tool for such pipe-line operations.

The authors, Hull, Kent, and Lee, emphasize that radioactive barium is particularly useful for this kind of work because of the fact that it has a half life of only 12.8 days and decays into $La^{140}$ which, in turn, rapidly (half life of 40 hours) decays to a nonradioactive isotope of cerium ($Ce^{140}$). In the original paper, tests were reported for a 5-mile pipe line; according to a recent announcement, however, it is being used successfully[32] by Standard Oil Co. of California in a 566-mile line extending from Salt Lake City to Pasco, Wash. A short-lived radioactive isotope of antimony is reported as being used in this particular line.

Another application with respect to pipe-line operation has been suggested by Schreiber,[33] who proposes to label with a radioactive isotope the


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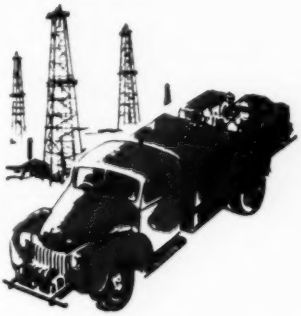
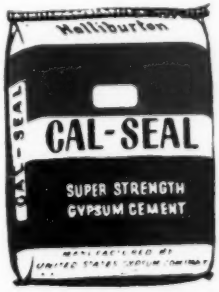


HOWCO crews, working with the newest, finest equipment, use CAL-SEAL Super-Strength Gypsum Cement to do special oil well cementing jobs quickly, dependably. United States Gypsum has been making CAL-SEAL since 1938 for super strength and stabilized, controlled set. It's teamwork like this—combining technical knowledge, expert service, and years of experience—that helps *you* increase *your* production.

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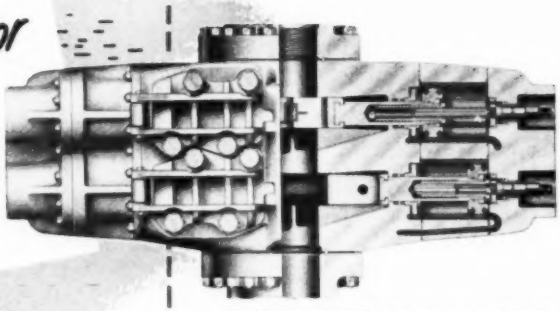
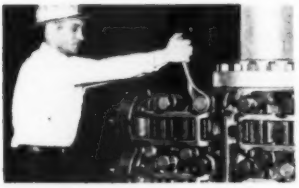
# In this gate *Simply Swing Open a Door to Change the Rams!* – whether pipe is in or out of the hole!

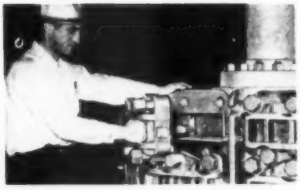


*The Shaffer Hydraulic Double Cellar Control Gate (above) combines two separate ram compartments in ONE body for maximum compactness. The Shaffer Hydraulic Single Cellar Control Gate is also available, if desired.*

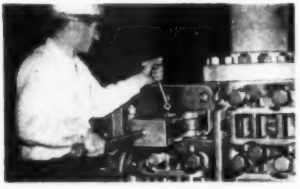
## SHAFFER HYDRAULIC CELLAR CONTROL GATES make ram changing as simple as this...



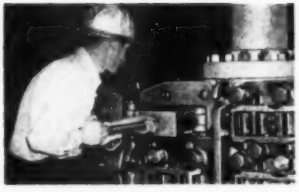
**1, UNBOLT TWO DOORS** in the side of the Gate by simply loosening four bolts in each door. The bolts remain in the doors where they won't be lost.



**2, SWING THE DOORS OPEN** and pull out the ram assembly. There is nothing to manually unlock and disengage—the complete ram assembly pulls right out.



**3, LIFT THE RAMS** from the Gate and replace the ram blocks and rubbers with others of the desired size—a quick and easy operation.



**4, SLIDE THE RAM ASSEMBLY** back into the Gate and bolt the doors. Guide ribs on the doors automatically align the ram assemblies as doors close.

**AND NOTE THIS**—*since the rams are changed from the side—not the end of the Gate, you can make a complete ram change with equal ease whether the pipe is in or out of the hole!*

Unequalled speed and simplicity in changing rams is only one of the many major advantages designed into Shaffer Hydraulic Cellar Control Gates. Other unique features are briefly outlined at right, but be sure to get the *complete* story on this Shaffer product before you buy *any* cellar control gate equipment. *No other equipment provides so much protection—in so small a space—with so many vital advantages!*

## FOUR OTHER VITAL SHAFFER ADVANTAGES

**Amazing Compactness**—The Double Gate combines *two* separate ram compartments unitized into *one* body with an overall height of only 30" even in sizes as large as 13⅝" (12" Series 900). The Single Gate of like size, with one ram compartment, is considerably less in height than any other hydraulic gate on the market, measuring only 18½" high overall!

**Fully Enclosed Design**—with all moving parts, including piston rod ram shafts, completely enclosed within the body of the Gate. There are no outside moving parts to become wedged or damaged by objects falling into the cellar—or become corroded by chemical and salt drippings. Even the locking shaft is non-rising, fully protected!

**Direct Hydraulic Drive**—with the hydraulic operating cylinders *directly behind* each ram for maximum simplicity and safety. There are no complicated indirect connections between hydraulic cylinders and rams!

**Quick Draining Body**—with the rams traveling on high narrow guide ribs above the steeply-sloped bottoms of the ram compartments. Mud and sand quickly drain back into the well—no detrimental accumulations to interfere with free ram travel!

**These and still other vital advantages combine to make the Shaffer Hydraulic Cellar Control Gate the most advanced hydraulic gate available today. Before you buy any control gate equipment, be sure to get the complete story from your nearby Shaffer representative—or write direct.**

*Write for your free copy of the new 1951 Shaffer Catalog. See Shaffer section—pages 4525 to 4600—of the 1951 Composite Catalog.*

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scrapers that are commonly used in pipe-line operation for clearing away sludge and deposits that may have accumulated. By thus labeling these scrapers, it is possible to locate them quickly when occasionally they may become lost or stuck in a particular piece of pipe line.

### Chemical Research

The third use that has been made of radioactive isotopes in the petroleum industry has to do with chemical research that is being employed in an endeavor better to understand the homogeneous or catalytic reactions that are involved in some of the petroleum processes that are either used today or may be important in petroleum technology in the coming years. These will now be briefly reviewed.

**Tracers.**—The radioactive isotopes of hydrogen and carbon as well as their nonradioactive isotopes have been extensively used in studying catalytic isomerization, polymerization, alkylation, and cracking of hydrocarbons by inorganic acids, by aluminum chloride, and by commercial cracking catalysts. Papers covering this type of work have been published, for example, by Turkevich and Smith,[3] Powell and Reed,[4] Stewart and Harmon,[5] McMahon and Hine,[6] and Blue and Engle.[7] An especially extended series of investigations in this particular field has been carried out by the late Dr. Otto Beeck and his coworkers at Shell Development Co.[8]

The experiments of McMahon and Hine[6] will serve to illustrate the useful type of information that can be obtained by radioactive tracer work. They made a study of the movement of carbon atoms within a molecule during isomerization processes over aluminum chloride at room temperature. The experiments using tertiary butyl chloride and 2-methyl-2 chlorobutane-2-$C^{14}$ can be illustrated by the following reactions:

$$\underset{\text{I}}{(CH_3)_2C^{14}X} \rightleftarrows \underset{\text{II}}{(CH_3)_2(C^{14}H_2)CX}$$

$$\underset{\text{III}}{(CH_3)_2C^{14}XCH_2CH_3} \rightleftarrows \underset{\text{IV}}{(CH_3)_2CXC^{14}H_2CH_3} \rightleftarrows$$

$$\underset{\text{V}}{(CH_3)_2CXCH_2C^{14}H_3} \rightleftarrows \underset{\text{VI}}{C^{14}H_2(CH_3)CXCH_2CH_3}$$

The experiment with the tertiary butyl chloride containing $C^{14}$ designated as compound I indicates that under operating conditions sufficiently drastic to convert a considerable portion of compound I into a polymer, the yield of compound II was only 1-3 per cent of the total conversion. Similarly, the experiment using amyl chloride (compound III) containing radioactive carbon showed that under conditions in which about 59 per cent of the original amyl chloride could still be recovered, the relative amounts of compounds III, IV, V, and VI were 64, 35, 1, and 0.1 per cent.

The foregoing results clearly indicate the effectiveness of tracer methods in determining the relative ease of exchanging secondary carbons with


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each other and the difficulty of exchanging secondary carbons and primary carbons in such compounds under a given set of experimental conditions. They are used here purely as an illustration of the type of information that can be obtained readily by use of a radioactive isotope and should not be considered necessarily as representative of the behavior of all isomerization catalysts. As a matter of fact, some of the findings here described are considerably different from those obtained by Beeck, Stevenson, Otvos, and Wagner[40] on the isomerization of butane containing $C^{14}$ over $AlBr_3$.

Incidentally, it should, perhaps, be pointed out that in an experiment of this kind using radioactive carbon as a tracer, it is necessary to degrade the various known compounds by very well-known reactions and test the carbon atoms thus isolated for radioactivity in order to tell the nature and extent of any shift that may have occurred in position of carbon atoms.

In concluding the discussion of the use of radioactive tracers in petroleum research, a few examples will be given from studies that have been made on catalysts and catalytic reactions. From time to time it has been suggested that appreciable amounts of $CH_4$ in a Fischer-Tropsch synthesis gas mixture can be incorporated directly into higher hydrocarbons over Co,[41] Fe or Ni[42] catalysts. The possibility of such direct utilization can be tested very sensitively by the use of radioactive methane.[43] Recently, for example, a gas consisting of 50 per cent radioactive methane and 50 per cent of a normal $CO-H_2$ synthesis mixture was circulated for several hours over an iron Fischer-Tropsch synthesis catalyst. The methane had an activity of 35,000 counts per minute per cc., whereas the synthesized hydrocarbons had an activity smaller than 100 counts per minute per cc. of $CO_2$ formed by burning the hydrocarbon.

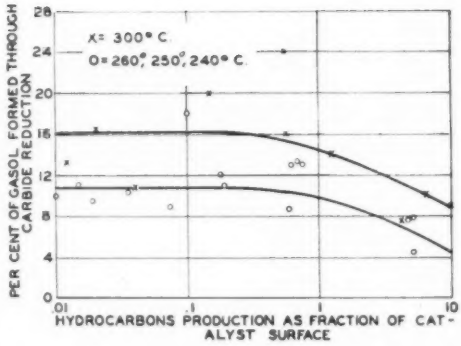



*Fig. 7—Per cent of hydrocarbon synthesis that proceeds through an intermediate carbide formation. Data were obtained using radioactive carbon as a tracer.*[45]

The very small activity of the final hydrocarbon products obtained in the foregoing synthesis experiment indicates clearly that practically no methane was incorporated into the hydrocarbons synthesized during the experiment. As a matter of fact, it is highly probable that even the slight radioactivity found in the reaction products was due to a trace of dissolved, highly radioactive methane from which it was very difficult to free the higher hydrocarbons.

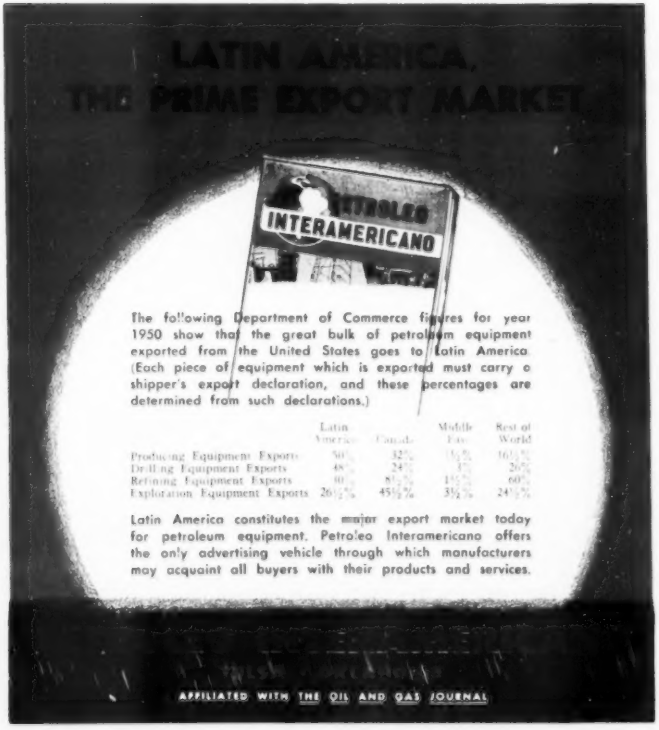
In another run, a mixture of $C_4H_8$ and radioactive $CH_4$ was circulated over a standard cobalt Fischer-Tropsch synthesis catalyst at 190° C for several hours to see whether any reported direct utilization of methane might result from the reaction of butene and $CH_4$ to form pentane.

Although the methane had an activity of 9,800 counts per minute per cc., the final higher hydrocarbon fraction showed an activity of only 3 counts per minute per cc., indicating that this reaction does not go over the cobalt catalyst under the test conditions employed. Of course, it must be realized that these two experiments do not necessarily establish that it will be impossible to incorporate methane in any such systems in the future. They do, however, illustrate that a radioactive tracer is a very sensitive means for ascertaining whether or not a reaction of this type is proceeding in any given system.

**Metallic catalysts.** — The remaining two illustrations are concerned with mechanism studies that have been made on these catalysts for producing synthetic gasoline from $CO-H_2$ mixtures by the Fischer-Tropsch process. Fischer originally suggested[44] that the synthesis of hydrocarbons over iron, cobalt, or nickel catalysts might well occur through the alternate formation and reduction of a metallic carbide.

When radioactive carbon became available, we undertook to check the reliability of this postulate by passing a $H_2-CO$ mixture over an iron catalyst containing considerable amounts of radioactive iron carbide. Since these experiments have been published elsewhere,[45] they will not be repeated here in detail. The results for all of the experiments that were carried out are summarized in Fig. 7.

The lower curve in Fig. 7 shows that when the amount of hydrocarbon formed during synthesis was equivalent to even as little as 1 per cent of the carbon atoms originally present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Drilling Equipment Exports 48% 24% 4% 24%
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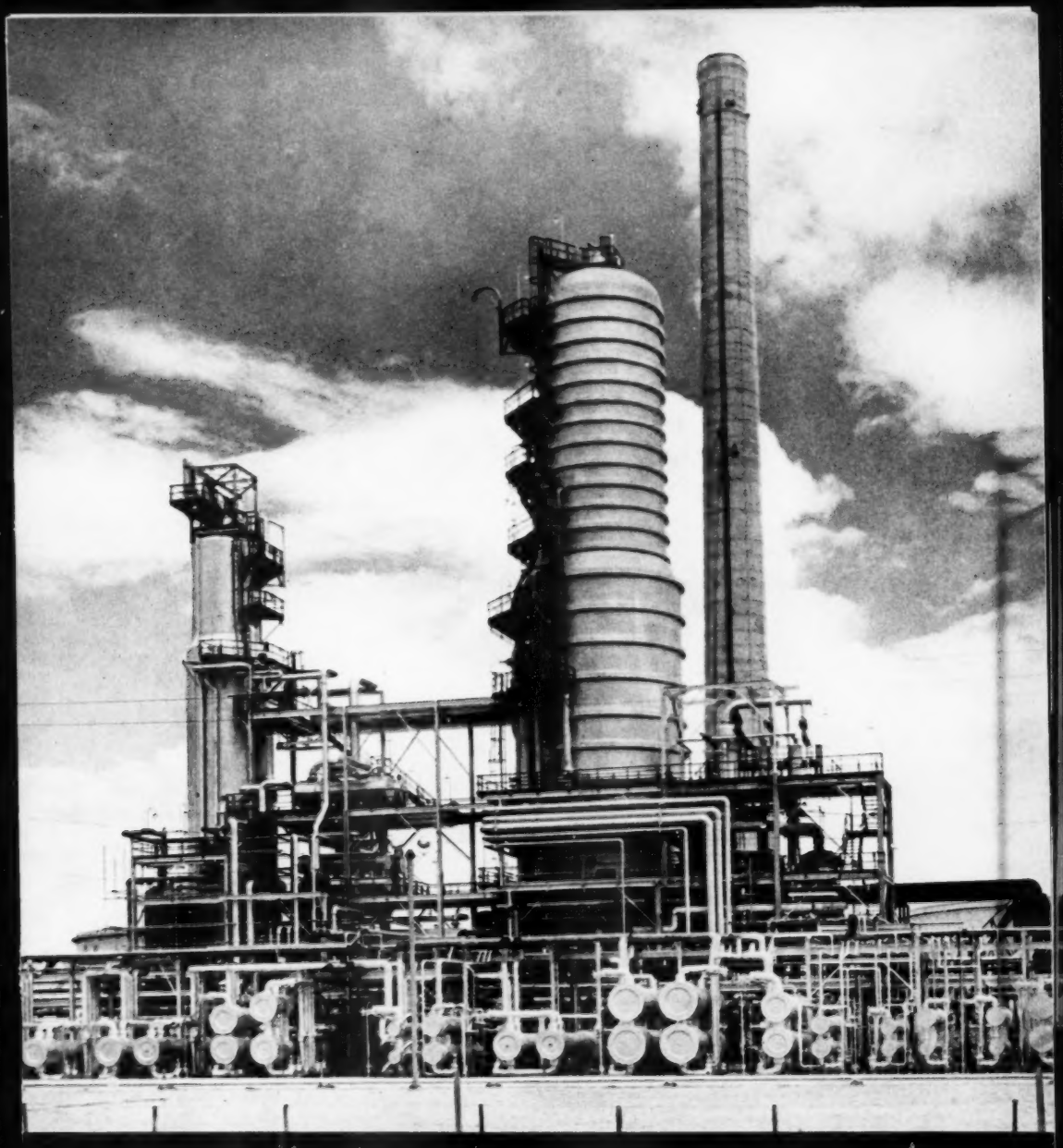

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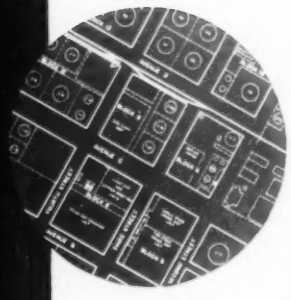

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as radioactive carbon in the surface of the catalyst, the radioactivity of this first trace of hydrocarbon formed was still about 10 per cent as great as it would have been if the carbide had been acting as the principal intermediate in the formation of higher hydrocarbons. If the catalyst is operated above 300° F., it appears that possibly as much as 16 per cent of the reaction might proceed through some type of process involving the reduction of a stable iron carbide on the catalyst surface.

In view of the fact that the carbide mechanism does not explain the mechanism by which Fischer-Tropsch synthesis occurs, an additional series of experiments using tracer methods has recently been undertaken to throw further light on the mechanism of synthesis.

For many years it has been suggested[40] that the building up of higher hydrocarbons on the surface of these Fischer-Tropsch catalysts might take place through formation of oxygenated organic compounds as intermediates. For example, it has been specifically suggested that ethyl alcohol might be such an intermediate. It occurred to us that it might be possible to test this hypothesis by carrying out an experiment in which radioactive ethyl alcohol was added to the synthesis gas and the final products analyzed for radioactivity. If the ethyl alcohol is actually capable of acting as an intermediate, then a given constant fraction of the hydrocarbon molecules synthesized on the catalyst surface would contain one such alcohol molecule as a nucleus from which the longer hydrocarbon would form. In other words, it appeared likely that if the ethyl alcohol added in these experiments actually acts as an intermediate in the synthesis, then the radioactivity per molecule of the hydrocarbons formed should remain approximately constant.

Fig. 8 shows the results of two experiments made by Kummer, Podgurski, Spencer, and the author.[41] One of them contained radioactive ethyl alcohol in which the methylene carbon

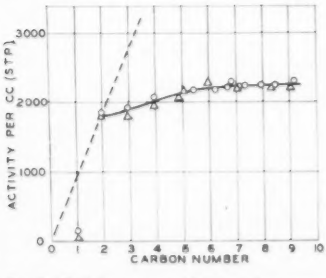


*Fig. 8—Activity per cc. of hydrocarbon vapor formed during synthesis run casing an α-labeled (△) and a β-labeled (○) radioactive ethyl alcohol. Activities of these two alcohols were respectively 6,000 and 5,500 counts per sec. per cc.*[41]

**TABLE 1 — PYROLYSIS OF PROPANE FROM FISCHER-TROPSCH EXPERIMENT WITH ADDED RADIOACTIVE ETHANOL**

| | Activity of $C_3H_8$ | Activity of $CH_4$ from pyrolysis of $C_3H_8$ |
|---|---|---|
| Run 4 ($CH_3C^*H_2OH$) | 1,860 | 120 |
| Run 6 ($C^*H_3CH_2OH$) | 1,970 | 880 |

was radioactive. The other represents the series of runs in which the methyl group in the alcohol was radioactive.

It is apparent from curves in Fig. 8 that the activity of the hydrocarbon products is substantially constant up to about $C_{10}$. There is a very slight increase in activity between $C_2$ and $C_3$, but between $C_3$ and $C_{10}$ the activity is substantially constant. This seems to confirm the idea that ethyl alcohol adsorbed on the surface of a catalyst can act as an intermediate in the building up of higher hydrocarbons by the successive addition of carbon atoms.

The radioactive carbon used permits the obtaining of even more information in regard to the nature of this synthesis. It became evident that by locating the position of the radioactive carbon in the propane produced in these synthesis experiments, it should be possible to tell whether the third carbon atom in the propane molecule attached itself originally to the methylene carbon of the ethyl alcohol group or to the carbon in the methyl group.

The result of a pyrolysis experiment in which the end carbon atoms from the propane molecule were removed by partial pyrolysis and analyzed for radioactivity is shown in Table 1. In the run in which the methylene carbon atom was labeled, the activity of the propane as a whole was 1,860 counts per minute per cc. If the extra carbon atom added exclusively to the α-carbon of this alcohol, then the end carbon atoms in the resulting propane should, of course, be nonradioactive. Instead of a zero radioactivity, the end carbon atoms had a count of about 120 counts per minute per cc. of methane. Similarly, in run 6 in which the methyl group on the alcohol was radioactive, the original propane had an activity of 1,970 counts per minute.

If the propane was formed by adding the third carbon atom exclusively to the methylene carbon of the alcohol complex, then the final methane formed by partial pyrolysis of the propane should have an activity of one-half of 1,970, or 985 counts per minute per cc. Actually, it had an activity of 880 counts per minute. These results seem to indicate that about 90 per cent of the carbons that add on to this alcoholic intermediate complex attach themselves to the α-carbon of the alcohol complex, and only about 10 per cent attach themselves to the methyl group of the complex.

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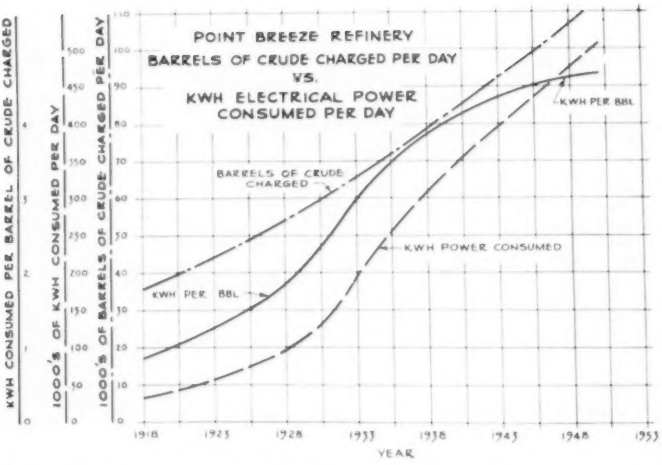



*Fig. 1—Electrical power-consumption chart on Atlantic Refining Co.'s Point Breeze refinery operations.*

# Electrical Engineering's Contribution to Oil

## Here is a review of the past 35 years, and some predictions of what we can expect in the future

**by Dr. L. M. Goldsmith***

THIRTY-FIVE years ago, when the writer entered the petroleum industry, there was less than 1 kw.-hr. of electrical energy consumed, per barrel of crude oil charged to what were then called stills.

Today, our own consumption, as shown on the curve (Fig. 1), is about 4.7 kw.-hr. per barrel charged. We think this represents an average cross-section in the industry. To realize what this has meant to electrical engineering in general, the manufacturers of electrical machinery, and the public utilities generating and selling power, one has only to look at the following figures:

Thirty-five years ago there were 674,840 bbl. of crude oil charged to stills per day, and at 1 kw.-hr. consumption per barrel, 674,840 kw.-hr. were consumed daily. Today, with the consumption of 4.7 kw.-hr. per barrel charged and runs to refinery equipment, as per the latest available figures charged in the United States of 6,491,530 bbl. today, there is a consumption of 30,500,000 kw.-hr. total per day. While the power consumption went up from 1 kw.-hr. to 4.7 kw.-hr. per barrel, the total increased 4,421 per cent for refining only.

So much for the influence of electrical engineering in the refining end of the petroleum industry. Now, let us turn for a moment to the pipeline end. Thirty-five years ago, and until the late twenties, oil-pipe-line pumping was done either by steam or diesel engines, usually direct connected to reciprocating pumps. Beginning in the late twenties, electric-motor-driven centrifugal pumps started to come into the picture for other than booster stations. The writer's company in 1929 put into service the first long line (512 miles), completely equipped with centrifugal pumps, electric-motor driven, using 11 pumping stations, with two 500-hp. motors in each station.

Beginning in the thirties the product pipe lines came into being, and with the exception of a very few of the first installations, which were diesel-engine driven, practically all of the product pipe-line pumps in the country today are driven by electric motors, many of them utilizing electronic control—all, of course, contributed by the electrical engineer. Through such engineering, product pipe lines today run with many different grades of oil in the line at the same time where perfect control is kept in the switching of each different product as required. The recent development of the microwave telephone has been a boon to pipe lines where wire facilities are not easily available.

Even in marine transportation of the petroleum industry the electrical engineer has contributed greatly, as evidenced by the fact that the Maritime Commission alone caused to be built 585 type T2-SE-A1 tankers, all of which are turbine-electric-driven ships, not to mention many other electrically propelled tankers, tugs, etc., built for private owners. The petroleum industry has more electrically propelled vessels than any industry in the world, or, in fact, any group of industries added together.

Electric pumping of oil wells is a very common thing today, and the application is becoming broader all of the time. Motor-driven drilling rigs are also in use where a power supply is available.

So that we see, in three decades, the electrical engineer has contributed mightily to the petroleum industry: (1) in getting oil out of the ground; (2) refining oil; (3) transporting it to the refineries; (4) transporting it from the refineries, etc.

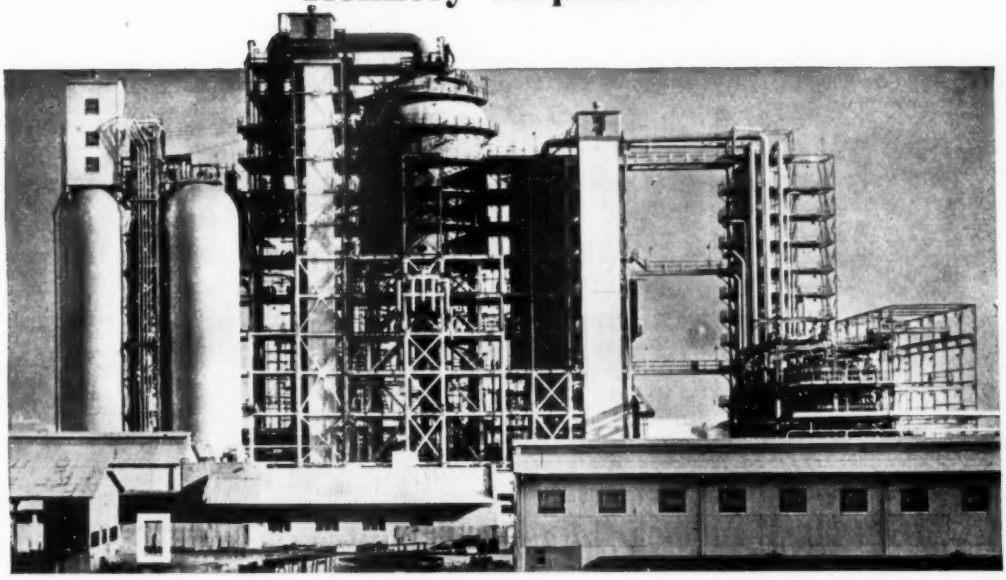
We question very much whether such a huge increase in the use of electrical energy is matched by any other industry, and yet nowhere have we ever seen set for the figures as given above to truly show what electrical engineering has done in the petroleum industry.

Now let us examine, briefly, what has brought about this increase in the use of electric power. From data available, it is evident that when one plots a curve of electrical consumption in the industry, from 1918 to 1950, the greatest rate of increase in consumption came in the years from 1925 to 1935. In our opinion, this was brought about by two things: (1) change in processing, which required less exhaust steam; and (2) the advent of more technically trained electrical and mechanical engineers in the industry who realized that many of their pumping problems could be solved by motor-driven equipment, rather than steam-reciprocating equipment which was only considered efficient when all of the exhaust steam could be utilized. Since 1935, the rate of increase in electrical demand, compared to the rate of increase in oil refined, has slowed down due to the increase in size of refining units and more efficient machinery.

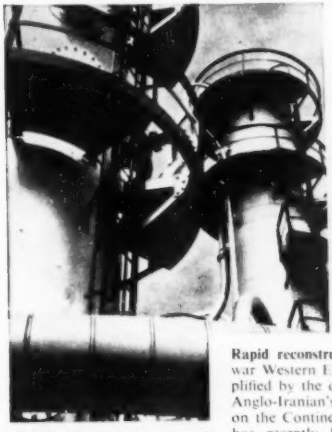
The electrical engineer really sold the use of motorized equipment through the development of oil-immersed starting equipment, which was explosion-resisting, and the development of the Class I Group D explo-

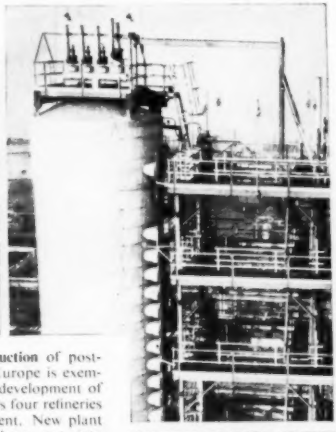
*Generat manager, engineering and construction department, Atlantic Refining Co., Philadelphia.

# Refinery Expansion

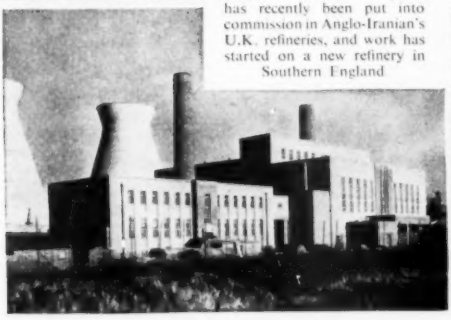


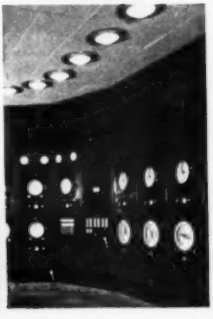
**Continued expansion** of Anglo-Iranian's many refineries in various countries accounts for steadily increasing throughput and higher quality of finished products. The size of the huge new catalytic cracking plant shown above can be judged from the figure of the man outlined on the lower left.





**Rapid reconstruction** of post-war Western Europe is exemplified by the development of Anglo-Iranian's four refineries on the Continent. New plant has recently been put into commission in Anglo-Iranian's U.K. refineries, and work has started on a new refinery in Southern England.





OIL PRODUCERS and refiners in the Middle East since 1912, Anglo-Iranian Oil Company and its associated companies operate eleven refineries in the United Kingdom, France, Germany, Italy, Israel, Irak, Kuwait and Australia. Their sales organisation includes major marketing or supply interests in Europe, Asia, Africa and Australasia, with international ships' bunkering and aviation services.

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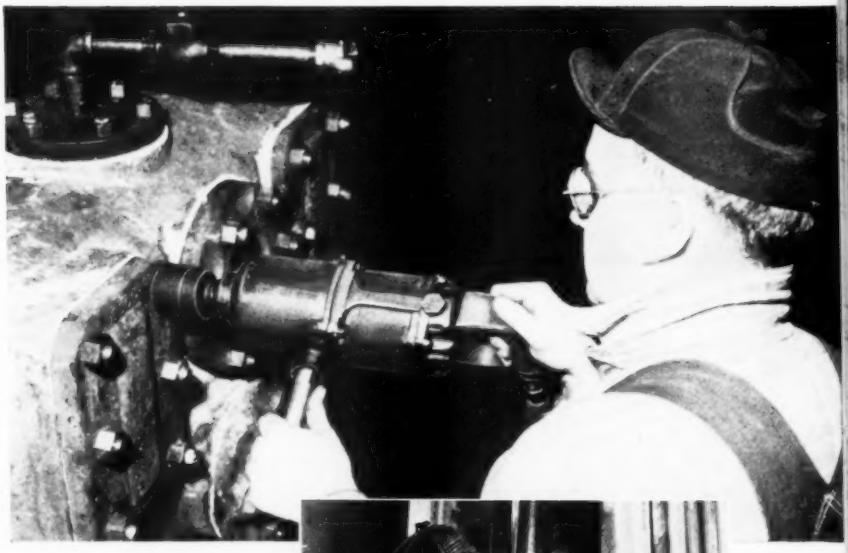

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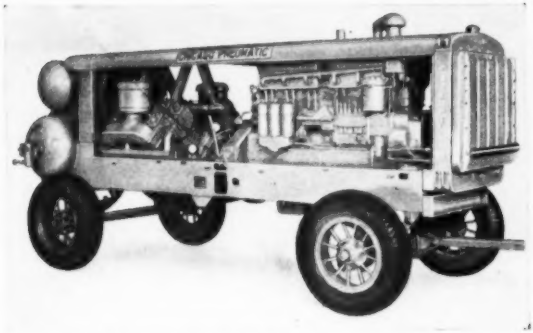

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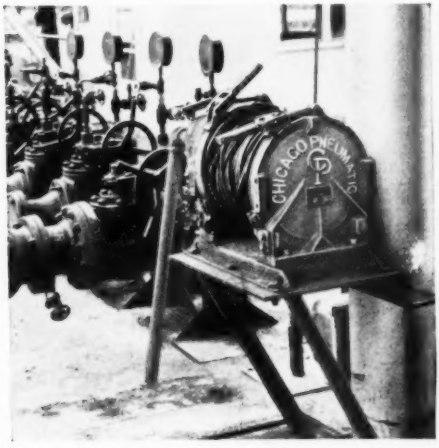
*Write for further information on CP equipment for refineries*

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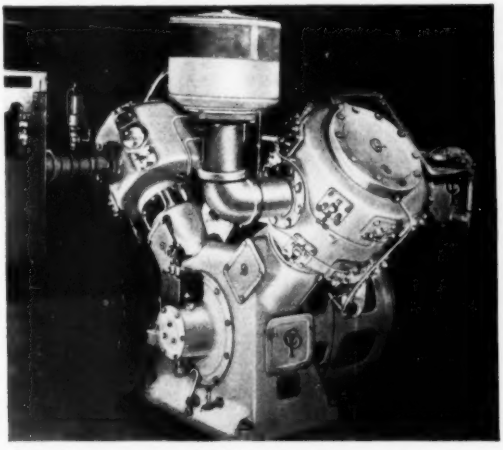


Type Y Compressors, ideal for close quarter installation, are shipped intact as "package units" ready for external connections.

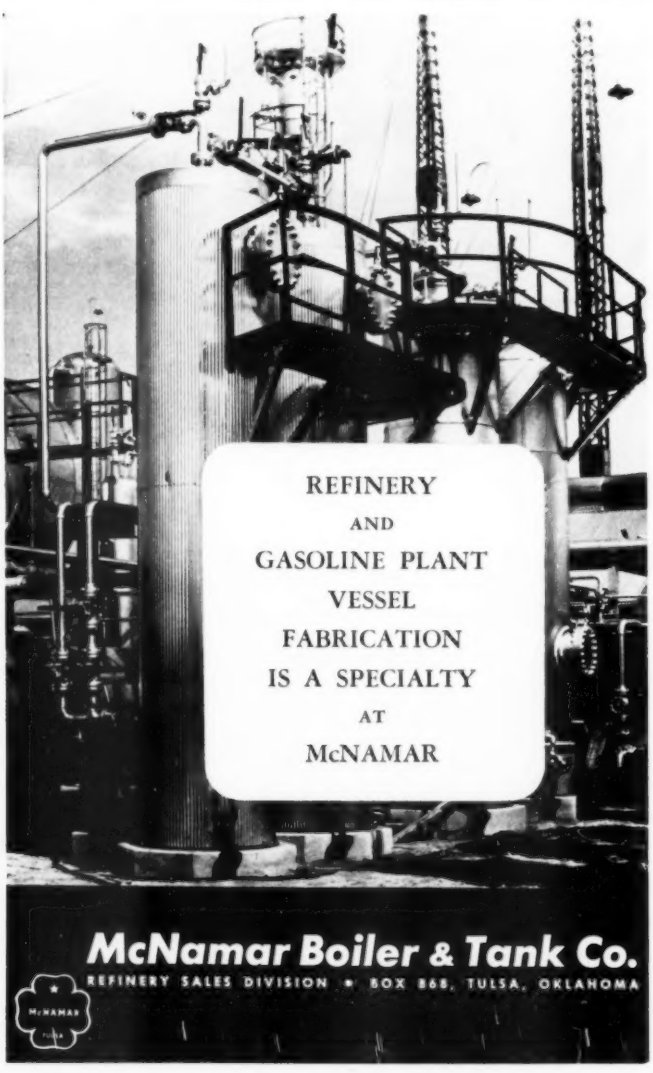
sionproof motor. These developments, together with oil-immersed switchgear, outdoor switchgear of all types, etc., have made available to the industry safe equipment at lower costs.

This development has advanced to the point where in the year 1950 our transformers are outdoor type; our motors are all outdoor explosionproof; our controls, our starters, our switchgear, and in fact the entire electrical engineering layout of a modern piece of refining equipment require no housing whatsoever. In these days of extremely high building costs, this has been a great advantage.

Now this is what electrical engineering, briefly, has done for the petroleum industry, and the writer would be remiss if he did not try to give his ideas of what the future holds forth for the industry as a result of further electrical engineering research.

We predict that the future will see motors of the explosionproof type, at much greater speeds than 3,600 r.p.m.; much lighter switchgear; a far greater use of nonferrous materials which will stand the atmospheres encountered in the petroleum refinery, and at the same time reduce the weight of the equipment; and greater use of electronic devices for controls, not only for motorized equipment but for the great instrumentation job that is so vital to modern refining apparatus.

Great as the strides have been over the period shown above, we believe that the future use of electric energy should be at an ever-increasing rate, and with the growth of the chemical industry in conjunction with petroleum refining, the electrical engineer will really come into his own.



## A New Electrical Analyzer

*(Continued from page 79)*

1. With the switch, SW (Fig. 3) in position 1, the production current is set to the desired value by the usual method.

2. With the ganged potentiometers, $R_1R_1$, in the counterclockwise position, SW is moved to position 2 and $R_1$ is adjusted until the strip chart recorder reads the same as it did when SW was in position 1.

3. $R_1$ is next adjusted until the strip chart recorder shows no change as $R_1R_1$ is rotated throughout its range.

4. $R_1R_1$ is set to the position, previously determined by calibration, required to cause the product $Q_RP_R$ to remain constant.

The calibration is obtained by trial and error, and consists of a graph showing the setting of the $R_1R_1$ dial versus the 100 per cent production rate current when SW is in position 1.

The calibration chart obtained for this unit is shown in Fig. 4. Table 1 gives the results of a test run to illustrate the degree of constancy of the product $Q_RP_R$ attained with this unit.

**TABLE 1**

| $P_R$ (psia) | $Q_R$ (cu. ft. per day | $Q_RP_R$ |
|---|---|---|
| 500.0 | 7,400 | $37.00 \times 10^5$ |
| 475.4 | 7,850 | $37.30 \times 10^5$ |
| 270.0 | 8,000 | $37.60 \times 10^5$ |
| 466.8 | 8,050 | $37.55 \times 10^5$ |
| 461.0 | 8,100 | $37.35 \times 10^5$ |
| 457.7 | 8,150 | $37.30 \times 10^5$ |
| 455.0 | 8,200 | $37.30 \times 10^5$ |
| 448.8 | 8,300 | $37.20 \times 10^5$ |

The largest error in the product, $Q_RP_R$, is seen to be 6 parts in 370. This amounts to an error of about 1.6 per cent.

### References


1. An Electrical Device for Analyzing Oil Reservoir Behavior, by W. A. Bruce, Petroleum Tech. & Dev., A.I.M.E. 151, 112. The Oil and Gas Journal, June 24, 1944, p. 63.

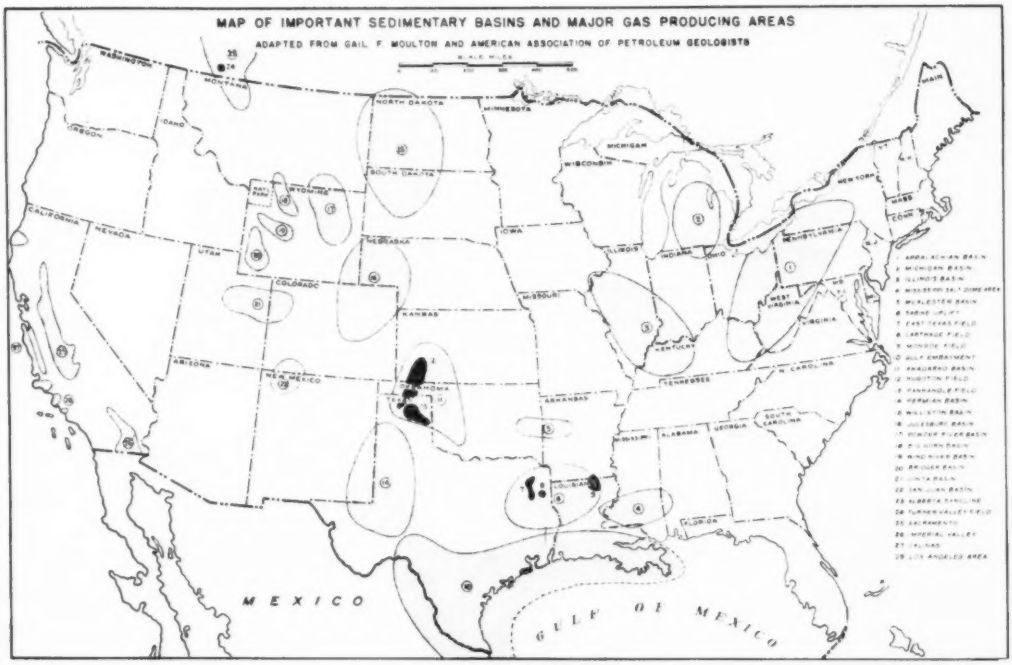
2. Physical Principles of Oil Production, by Morris Muskat, p. 568, McGraw-Hill, New York, 1949.

3. Operation Manual for the Carter Oil Pool Analyzer, by Irene Haskett, Carter Oil Co., Research Div., Tulsa, 1947.


## BOOKS

VISCOSITY AND PLASTICITY. By E. N. da C. Andrade. Published by Chemical Publishing Co., 212 Fifth Avenue, New York. 84 pp. $2.25.

The author outlines in this book of three lectures the phenomena of viscosity and plasticity with lucidity and in an enjoyable style. The subject is covered with a special view to those who deal with viscous and plastic materials on an industrial scale, and especially to paint technologists.


MAP OF IMPORTANT SEDIMENTARY BASINS AND MAJOR GAS PRODUCING AREAS
ADAPTED FROM GAIL F. MOULTON AND AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
MEXICO
GULF OF MEXICO

## A Method of

# Estimating Gas Reserves

**by Ralph E. Davis**

**There are three basic methods of estimating reserves. In the one here described, the reserve is computed on the basis of the amount of pore space present in the reservoir and the volume of gas present in the pore space. Recovery factor is based fundamentally upon production experience in similar older fields.**

GAS-RESERVE estimates are frequently difficult to make and in any case require very careful study of all factors involved. Estimates frequently differ widely.

There are three basic methods of estimating reserves:

One of the methods is the comparison with similar type fields of known yields. For example, a group of fields may be producing from the same type of reservoir in a particular area. It is possible that some of the fields have been produced for a long time and are near depletion. The known per acre yields based on actual production of the old fields then can be used as a basis for estimating what the less-depleted reservoirs will ultimately produce. This method obviously has its limitations, and it is used generally when few data concerning the field in question are available.

Certain sands, such as the Miocene sands of the Gulf Coast area, are known to be prolific producers. Others, such as the Texas Wilcox, are known to produce sparingly. The Big Injun sand and the Berea in West Virginia are long-lived producers—the Salt sands are generally short lived. Knowledge such as this is valuable in evaluating at the time of the discovery the potential productiveness of a newly found pool. But it is a poor yardstick for close estimation.

Another estimating technique is the production-performance method. If a well or pool is allowed to produce without interference it will perform with great uniformity, i.e., it will produce at a fairly constant rate per pound decline in reservoir pressure, or its rate of production will decline in accord with understood laws of physics. This affords a basis by which the reserve can be estimated with fair accuracy. Not all fields or wells produce with regularity, but an experienced appraiser can evaluate the degree of dependability of various estimates based on production performance. Even under proration restrictions, when wells are controlled so as to produce at arbitrary rates, there are ways in which the production-performance method can be used with reasonable accuracy.

The application of this method will be different depending upon whether or not there is a marked tendency for the reservoir to fill up with water as the gas is withdrawn. If there is little or no water encroachment, then the reservoir may be considered as a gas container of constant volume. If the estimator knows the pressure decline that has resulted from a certain volume of production, the amount of gas contained in the reservoir at any given pressure can be determined.

This relationship can be extrapolated to an assumed abandonment

pressure, and the result is an estimate of the reserves which may be recovered. Generally, the field must have produced more than 10 per cent of its original volume of gas before this method can be considered reliable, and of course as the field becomes more nearly depleted, the accuracy of the method increases.

If there is substantial water encroachment in the reservoir as the gas is withdrawn, then the size of the container is gradually decreasing, and the method must be modified to take this fact into account. Sometimes a relationship can be established between the amount of water encroachment and the amount of gas.

In the third method, the gas reserve is computed on the basis of the amount of pore space present in the reservoir and the volume of gas present in the pore space. This involves area, thickness, porosity, connate water, pressure, temperature, and deviation. After the gas in place is calculated, a recovery factor is applied. The recovery factor is based fundamentally upon production experience in similar older fields with modifications to take into account the particular reservoir conditions of the accumulation under study.

In order to determine the amount of gas in place it is necessary to know the areal extent of the reservoir, the average thickness of the pay, the average porosity of the reservoir rock, and the degree to which the pore space is saturated with gas. The last two items mentioned (pore space and degree of saturation) are obtained from laboratory analyses of cores that are taken from the formation while the wells are being drilled.

Recovery factors applied against the free gas in place usually are estimated between 75 and 90 per cent. Recoveries of dissolved gases are generally lower than those of the free gas. Dissolved gas is that gas which occurs in solution in the reservoir oil. As the oil is produced and the pressure drops from reservoir conditions to atmospheric conditions, the gas comes out of solution. The process is quite similar to that observed when one opens a carbonated beverage and allows the gas to escape from the bottle. Solution or dissolved gas is produced with oil and the gas is usually referred to as casing-head gas. Some casing-head gas is very rich and yields as high as 200 bbl. of liquid per million cubic feet of gas.

The description of gas-reserve estimating techniques has been general and brief, but it may have suggested the large number of variables and unknowns that must be considered in making an estimate. Two competent men, equally well informed about a particular reservoir, are quite likely to have different ideas concerning the amount of reserve present in the reservoir, as also of the amount thereof recoverable.

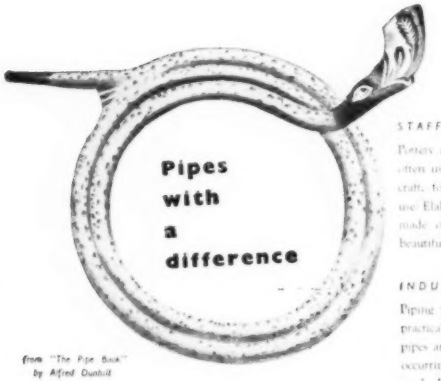
One source of variation in estimates lies in what exactly is being estimated. Usually estimates are of "proven" reserves only, but this concept cannot be exactly defined. A

## THE AUTHOR

**Ralph E. Davis, consulting engineer, Houston, received a B.S. degree in general engineering from University of Wisconsin in 1906 where he majored in geology. Since then he has been actively engaged in geological and engineering work for 45 years, and from 1920 on his practice has been in the consulting field with the oil and natural-gas industries.**

**During the years in which the natural-gas industry has expanded to its present proportions, he has been identified in gas supply and other studies for a major portion of this development. His clients have included investment banking firms, insurance companies, and natural-gas pipeline companies of the United States and Canada.**

**The discussion given in this paper is from the author's report this year to the Life Officer's Investment Seminar, held at Beloit, Wis.**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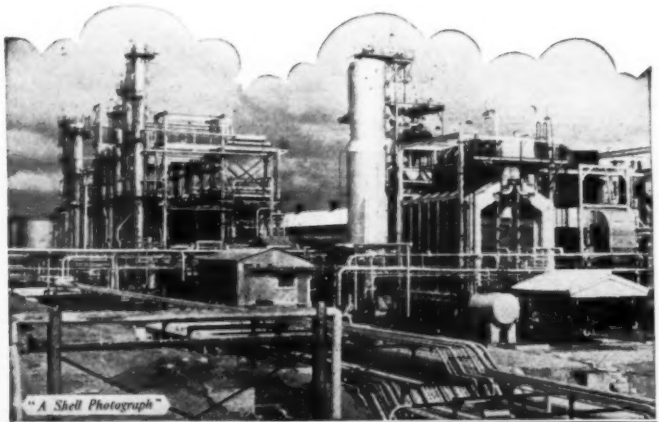


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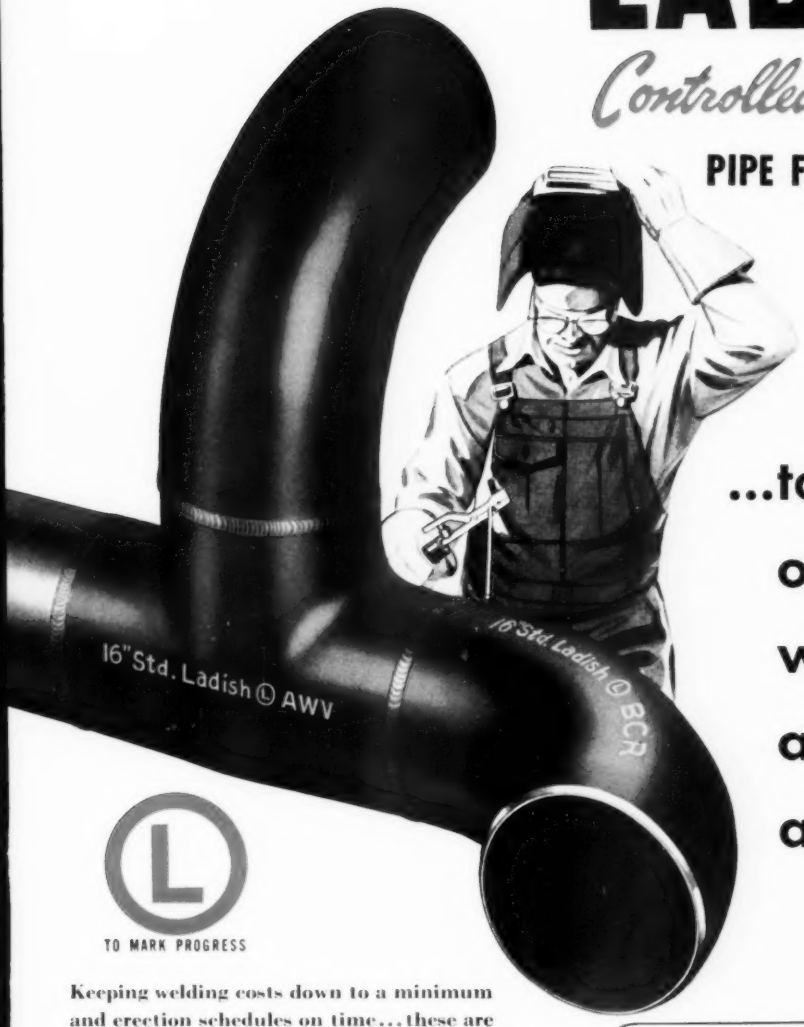


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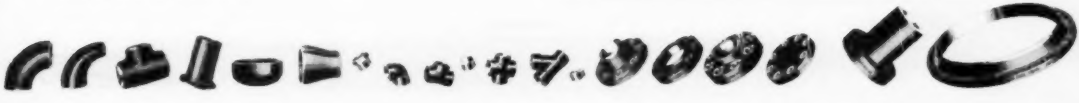

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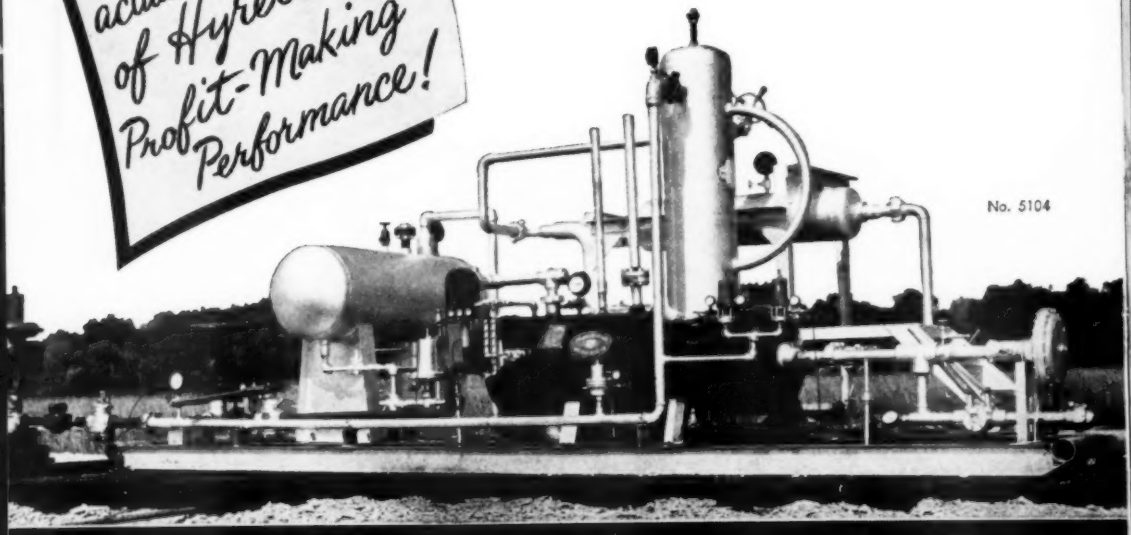

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productive area is not completely outlined until it has been developed by drilling. Where lack of knowledge makes it necessary to classify reserves less definitely than proven, estimates are made of probable reserves; the dividing line between proven and probable is shadowy. Some estimators seem inclined to include as proven, reserves which another might classify as probable. In addition, the amount of recoverable reserves is partly economic as well as technological. When the economic life of a well or field comes to an end, the meaning is that the underground pressure has declined so the rate of flow is so slow that the value of the production no longer justifies its cost. The value of the production is a function of the price of gas as well as the daily amount of gas produced. The higher the price of gas, the lower abandonment pressure, and the greater the recoverable reserves. So in estimating recoverable reserves, some assumption must be made about abandonment pressure, and that involves an assumption about the value of gas at a relatively uncertain future time.

To summarize this discussion of methods of estimating reserves and their limitations, it may be said that as time goes by in the life of a given field, reserve estimates tend to become more accurate because more information is available.

### Nation's Gas Reserves

The large oil and gas fields occur in the regions of deep basins; this discussion will be devoted to the proved gas reserves and the reserve potential of the more important basins of the United States. The general distribution of these structural depressions which contain important thicknesses of sedimentary rock and the great bulk of our proved reserves can be observed on the accompanying map.

In the eastern United States is the Appalachian basin which covers portions of Pennsylvania, West Virginia, New York, Ohio, and Kentucky. The area of the basin, which is one of the oldest producing regions in our nation, is approximately 94,000 sq. miles. The proved remaining gas reserve is estimated at 3.5 trillion cubic feet, or less than 2 per cent of the United States total. Large volumes of sediments remain to be explored in the Appalachian basin, but widely distributed wells which have penetrated the entire thickness of prospective producing formations provide evidence that the remaining unexplored rocks include only a small portion of potential gas-reservoir beds. There will be future gas discoveries of importance in this area, but it is doubtful that these will have large significance when viewing the national picture. For a number of years past the annual additions to reserves of the area have averaged about 40 per cent of the annual withdrawals.

Moving westward, on the map, it can be seen that the Michigan and Illinois basins each cover fair-sized areas. The combined size, speaking in terms of areal extent, is about 70 per cent of that of the Appalachian basin. The proved reserves of the Michigan and Illinois basins are 195 billion and 320 billion cubic feet, respectively. Most of this reserve occurs in solution in the oil and will be produced as casing-head gas. Exploration in these areas to date, while not complete, is sufficient to indicate that important future gas discoveries are unlikely.

Production in California is primarily oil. The known gas reserve of the state is almost 10 trillion cubic ft, of which about one-fourth is nonassociated. The California gas-oil relationship can be pictured more clearly by noting that this state possesses 15 per cent of the country's proved oil reserves and only 5 per cent of the country's proved gas reserves. In California the largest free gas fields are located in the northern portion of the Sacramento basin, relatively close to the city of San Francisco. Deeper drilling and other exploration will add to the California reserves, but probably in nominal amounts as compared to the demand for gas. Large amounts of gas are now going to California from the Permian basin area of West Texas and southeastern New Mexico.

Moving northward on the map to northwest Montana, the southern tip of the Alberta syncline occurs. This region of Montana is in the mountain front area and the structural geology is very complex. Two large fields, Kevin-Sunburst and Cut Bank, have been discovered there and make up a large portion of Montana's proven gas reserve of 800 billion cubic feet. Cut Bank field, incidentally, is another stratigraphic-trap-type accumulation. In general, recent exploratory drilling in Montana has been discouraging, but large areas remain to be tested. It is considered probable that other fields of the Turner Valley type will be found in front of the Rocky Mountains in Alberta and possibly Montana. Turner Valley, Jumping Pound, and Pincher Creek fields are located in Alberta and each has been proved to be a field of major reserves.

The Williston basin roughly covers 70,000 sq. miles in North Dakota, South Dakota, and eastern Montana. During the past few years, leasing and exploration operations have been active. The vast basin has been virtually unexplored. A wildcat well recently encountered oil with a high gas-oil ratio at a depth of 11,650 ft. in the North Dakota portion of the basin. It is probable that additional drilling in the basin will result in the discovery of other fields, with both oil and gas production.

The basins of Wyoming are being intensively explored. The proven gas reserve of that state now approx-

*(Continued on page 107)*

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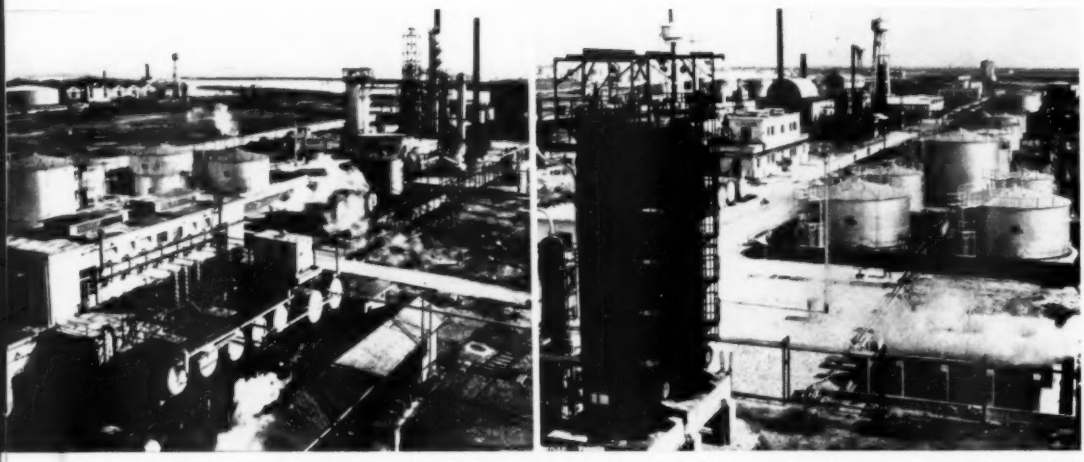

*Views of the I.R.O.M. plant in Venice. Now being enlarged, the refinery is scheduled for ultimate crude-oil capacity of 22,000 bbl. daily.*

# Venice Refinery Undergoing Expansion

## Output will be more than doubled when eight-point program is completed. Plans call for processing Middle East oil

**by V. S. Swaminathan***

LATE in 1948 Industria Raffinazione Oli Minerali (I.R.O.M.) was formed jointly by Azienda Generale Italiana Petroli (A.G.I.P.) and Anglo-Iranian Oil Co. (A.I.O.C.) to step up the crude throughput of the Venice refinery adjoining the village of Mestre. This increase was from a nominal capacity of 400,000 to 1,000,000 tons a year. Plans also included processing of Middle East crude oil.

The new integrated refinery will ultimately include in its processing layout the following:

1. Existing Foster Wheeler topping plant, 10,000 bbl. per stream day.
2. New Foster Wheeler combination unit, 12,000 bbl. per stream day (with vacuum section 5,600 bbl. per stream day).
3. Stabilization plant.
4. Existing coking plant, 1,200 bbl. per stream day.
5. New thermal reformer, 6,000 bbl. per stream day.
6. New catalytic polymerization unit, 1,300-1,400 bbl. per stream day charge capacity.
7. Acid and plumbite treating plants.
8. Industrial-lubricants plant.

The following utilities will be supplied from the subjoined installations:

1. Two steam-generating plants each having four oil-fired boilers.
2. Water pump house drawing cooling water from the Vittorio Emanuelle Canal through three steam-turbine-driven pumps.
3. An electrical-generator transformer plant. Main electric power will be obtained from outside sources, but so far as essential loads are concerned power electricity will be generated inside the refinery by diesel-driven equipment.

When the project is completed the new refinery will be equipped with facilities for dispatch of products by ship, barge, and rail tank car. To meet these needs development of existing dock and jetty facilities as well as rail sidings, is in progress.

Main products of the refinery will comprise premium and regular-grade motor gasolines, kerosine, gas oil, fuel oil, and industrial lubricating oils; the latter together with bitumens, are to be marketed through the associated organization R.O.M.S.A. whose plant is near the refinery site. The remainder of the refinery products will be marketed through already existing appropriate Italian agencies.

The Venice refinery was originally built in 1919 for processing residue for bitumen production. A decade or so later its operation was taken over by another group, which erected a heavy-oil cracking and batch redistillation unit. The first major plant installations were made in the early thirties, when two U.O.P. (Dubbs) crackers were built, together with a McKee redistillation unit. In 1934 the refinery came under A.G.I.P. The succeeding year saw further expansion, including the construction of a petroleum dock, and the first Foster Wheeler crude-distillation unit.

About this time the causeway connecting the mainland to Venice was completed, which considerably improved the commercial status of the refinery. Until 1944 the refinery treated crude received in rail tank cars from Romania. In that year the site was heavily bombed by Allied Air Forces, and the refinery, with other neighboring industrial installations, was largely destroyed.

The refinery served as a bulk storage depot under the Allied military occupation from May 1945 until July 1946, when a certain amount of reconstruction work was executed. The Foster Wheeler distillation unit and the Dubbs cracker were rehabilitated, and brought back on stream in 1947, followed by the second U.O.P. (Dubbs) cracker 2 years later, which during the reconstruction was converted into a reformer.

Plans for the new refinery, entailing additional capacity, with necessary specialized units to insure improvement in product quality, and utility plant with special reference to the supply of power and cooling

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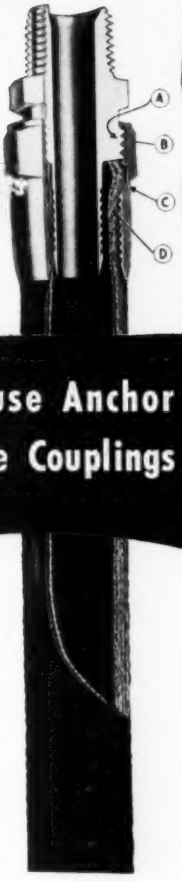


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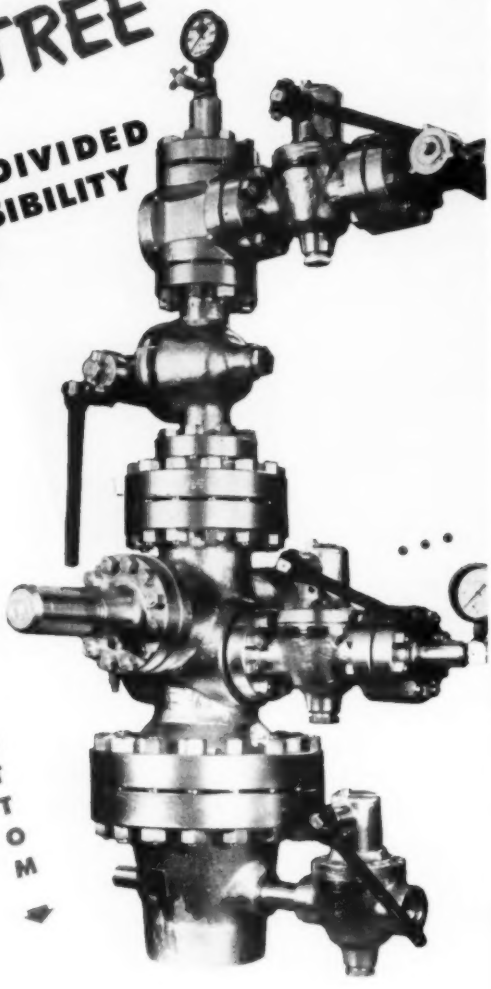
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water were jointly executed by I.R.O.M. in Italy and the A.I.O.C. in London. A license was procured from the Italian Government, authorizing refinery operations on Middle East crude, and also the eventual manufacture of lubricating oils.

Orders were then placed in the United States for the design and purchase of process units, and negotiations were opened with the appropriate local authorities and ECA to obtain a dollar loan covering expenditure in America on fees and certain essential materials. A loan of $1,800,000 was eventually secured, and a contract placed with Foster Wheeler Corp. for a 12,000-bbl. per stream day combination atmospheric and vacuum distillation unit. A sterling loan was also obtained from the Italian Government financial agency to cover the purchase in Britain of a considerable portion of the material and equipment needed for the project.

Design for the new crude-distillation unit was approved in 1949, and purchasing began both in the United States and Great Britain. At the same time work was begun on development of the layout of the refinery and the utility needs so as to integrate the envisaged expansion with the existing installation.

A contract was placed with a firm of engineers in Rome for all drafting and development work outside the process units. Contract for the design and procurement work of a thermal reforming plant to produce high-grade motor spirit was awarded to M. W. Kellogg Co. which had designed similar units for other refineries of the A.I.O.C. group. In view of the rising trend of motor-spirit octane level in Italy it was decided to install a catalytic polymerization unit to handle the excess gases from the reformer. This was also ordered from M. W. Kellogg Co., and is designed to produce, in addition to the required polymer, liquid butane fractions for sale to a local liquid petroleum gas bottling and distribution company near the refinery with whom the I.R.O.M. has a supply contract.

To keep in line with the license granted to the refinery, and meet market demands made on I.R.O.M., decision has been made to manufacture industrial lubricants from a wax-free residue. Development work is now under way on the design of acid and clay treating plants for production of these lubricants.

For accommodating some of the new plants additional land adjoining the refinery site was purchased to bring the total refinery area to 136 acres. Even this enlarged area is deemed insufficient since provision has to be made for the installation of complete lubricating oil manufacturing units in the process zone and possibly for additional crude-oil reserve storage.

Only essential minimum tank capacity for finished products is located in the refinery.

## Estimating Gas Reserves

*(Continued from page 103)*

imates 2¼ trillion cubic feet or slightly more than 1 per cent of the nation's total. Future gas discoveries from the area are not expected to have any great effect on the national outlook.

Colorado has a proven gas reserve of 1 trillion cubic feet, most of which comes from two fields—solution gas from the large Rangely oil pool in the northwest portion of the state, and free gas from Barker Creek field, located in the southwest corner of the state. Future gas discoveries can be expected from wildcatting in the Julesburg basin in the east part of Colorado and from drilling in San Juan basin.

The bulk of the San Juan proven reserve, 2⅕ trillion cubic feet, is located in New Mexico. This gas has been found largely in stratigraphic traps on the western edge of the basin. Some of the San Juan basin gas reservoirs may cover more than 250,000 acres. The yield per acre, however, is expected to be low.

The proven gas reserve of Kansas and Oklahoma is about 25 trillion cubic feet, most of which is in the great Hugoton field. The Texas portion of Hugoton field alone contains a reserve of about 5½ trillion cubic feet. Also in this area of Texas is Panhandle field. Panhandle field's reserve is estimated at 18 trillion cubic feet. Prospective reserves of substantial proportions are expected to be discovered in the Anadarko basin.

The Permian basin of Texas and New Mexico covers about 60,000 sq. miles. The proven gas reserve of this prolific area is placed at 19½ trillion cubic feet, 3.8 trillion of which is nonassociated gas. Of the dissolved gas, about 2½ trillion cubic feet lies in the Scurry County reef field. It is interesting to note that the first commercial field in the Permian basin was discovered in 1922, and while drilling in the area has been fairly steady since then, much oil and gas is still being discovered.

On the opposite side of Texas and extending across northern Louisiana are many fields in the area surrounding the Sabine Uplift. This area is the site of many important accumulations, the foremost being East Texas oil field and Carthage and Monroe gas fields. The proven gas reserve of this area is approximately 17 trillion cubic feet, a quarter of which lies in 225,000-acre Carthage field.

The interior salt-dome basin of southern Mississippi contains a proven gas reserve of 2½ trillion cubic feet.

The Gulf Coastal area of Texas and Louisiana with its 65 trillion cubic feet of proven gas reserve represents 35 per cent of the total United States. The increase in reserves in 1950 in the Gulf Coastal area was almost 3 trillion cubic feet of a total increase for the nation of 5.2 trillion cubic feet.

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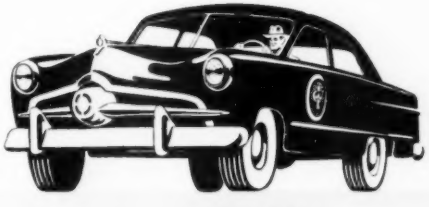

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**TABLE I—COMPOSITIONS OF STANDARD AND TENTATIVE STANDARD ALTERNATE STEELS**

| Grade | For conserving | C | Mn | Cr | Ni | Mo |
|---|---|---|---|---|---|---|
| 14B35 | Ni and Mo | 0.33-0.40 | 0.70-1.00 | | | |
| 14B50 | Ni and Mo | 0.47-0.55 | 0.70-1.00 | | | |
| 14B52 | Ni and Mo | 0.47-0.55 | 1.20-1.55 | | | |
| TS 50B46 | Ni and Mo | 0.43-0.50 | 0.75-1.00 | 0.20-0.35 | | |
| 50B15 | Ni and Mo | 0.12-0.18 | 0.70-1.00 | 0.35-0.60 | | |
| 50B20 | Ni and Mo | 0.17-0.23 | 0.70-1.00 | 0.35-0.60 | | |
| 50B30 | Ni and Mo | 0.27-0.34 | 0.70-1.00 | 0.35-0.60 | | |
| 50B35 | Ni and Mo | 0.32-0.39 | 0.70-1.00 | 0.35-0.60 | | |
| 50B37 | Ni and Mo | 0.34-0.42 | 0.70-1.00 | 0.20-0.40 | | |
| 50B40 | Ni and Mo | 0.37-0.45 | 0.70-1.00 | 0.35-0.60 | | |
| 50B44 | Ni and Mo | 0.42-0.50 | 0.70-1.00 | 0.35-0.60 | | |
| 50B46 | Ni and Mo | 0.43-0.50 | 0.75-1.00 | 0.20-0.35 | | |
| 50B49 | Ni and Mo | 0.47-0.55 | 0.70-1.00 | 0.20-0.40 | | |
| 50B50 | Ni and Mo | 0.47-0.55 | 0.70-1.00 | 0.35-0.60 | | |
| 50B60 | Ni and Mo | 0.55-0.65 | 0.70-1.00 | 0.35-0.60 | | |
| 80B15 | Ni and Mo | 0.12-0.18 | 0.60-0.90 | 0.15-0.35 | 0.20-0.40 | 0.08-0.15 |
| 80B17 | Ni and Mo | 0.14-0.20 | 0.60-0.90 | 0.15-0.35 | 0.20-0.40 | 0.08-0.15 |
| 80B20 | Ni and Mo | 0.17-0.23 | 0.60-0.90 | 0.15-0.35 | 0.20-0.40 | 0.08-0.15 |
| 80B25 | Ni and Mo | 0.21-0.28 | 0.60-0.90 | 0.15-0.35 | 0.20-0.40 | 0.08-0.15 |
| 80B30 | Ni and Mo | 0.27-0.34 | 0.55-0.80 | 0.15-0.35 | 0.20-0.40 | 0.08-0.15 |
| 80B35 | Ni and Mo | 0.32-0.39 | 0.65-0.95 | 0.15-0.35 | 0.20-0.40 | 0.08-0.15 |
| 80B40 | Ni and Mo | 0.37-0.45 | 0.70-1.00 | 0.15-0.35 | 0.20-0.40 | 0.08-0.15 |
| 80B45 | Ni and Mo | 0.42-0.50 | 0.70-1.00 | 0.15-0.35 | 0.20-0.40 | 0.08-0.15 |
| 80B50 | Ni and Mo | 0.47-0.55 | 0.70-1.00 | 0.25-0.50 | 0.20-0.40 | 0.08-0.15 |
| 80B55 | Ni and Mo | 0.50-0.60 | 0.70-1.00 | 0.30-0.55 | 0.20-0.40 | 0.08-0.15 |
| 80B60 | Ni and Mo | 0.55-0.65 | 0.70-1.00 | 0.30-0.55 | 0.20-0.40 | 0.08-0.15 |
| 81B35 | Ni and Mo | 0.32-0.39 | 0.70-1.00 | 0.30-0.55 | 0.20-0.40 | 0.08-0.15 |
| 81B40 | Ni and Mo | 0.37-0.45 | 0.70-1.00 | 0.30-0.55 | 0.20-0.40 | 0.08-0.15 |
| 81B45 | Ni and Mo | 0.42-0.50 | 0.70-1.00 | 0.30-0.55 | 0.20-0.40 | 0.08-0.15 |
| 81B50 | Ni and Mo | 0.47-0.55 | 0.75-1.05 | 0.35-0.60 | 0.20-0.40 | 0.08-0.15 |
| TS 94B17 | Ni and Mo | 0.15-0.20 | 0.75-1.00 | 0.30-0.50 | 0.30-0.60 | 0.08-0.15 |
| TS 94B20 | Ni and Mo | 0.17-0.22 | 0.75-1.00 | 0.30-0.50 | 0.30-0.60 | 0.08-0.15 |
| TS 86B45 | Ni and Mo | 0.43-0.48 | 0.75-1.00 | 0.55-0.75 | 0.40-0.70 | 0.08-0.15 |
| TS 8115 | Molybdenum | 0.13-0.18 | 0.70-0.90 | 0.30-0.50 | 0.20-0.40 | 0.08-0.15 |
| TS 8117 | Molybdenum | 0.15-0.20 | 0.70-0.90 | 0.30-0.50 | 0.20-0.40 | 0.08-0.15 |
| TS 8120 | Molybdenum | 0.18-0.23 | 0.70-0.90 | 0.30-0.50 | 0.20-0.40 | 0.08-0.15 |
| TS 8122 | Molybdenum | 0.20-0.25 | 0.70-0.90 | 0.30-0.50 | 0.20-0.40 | 0.08-0.15 |
| TS 8123* | Molybdenum | 0.20-0.25 | 0.70-0.90 | 0.30-0.50 | 0.20-0.40 | 0.08-0.15 |
| TS 8125 | Molybdenum | 0.23-0.28 | 0.70-0.90 | 0.30-0.50 | 0.20-0.40 | 0.08-0.15 |
| TS 8126* | Molybdenum | 0.23-0.28 | 0.70-0.90 | 0.30-0.50 | 0.20-0.40 | 0.08-0.15 |
| TS 8127 | Molybdenum | 0.25-0.30 | 0.70-0.90 | 0.30-0.50 | 0.20-0.40 | 0.08-0.15 |
| TS 8128* | Molybdenum | 0.25-0.30 | 0.70-0.90 | 0.30-0.50 | 0.20-0.40 | 0.08-0.15 |
| TS 8130 | Molybdenum | 0.28-0.33 | 0.70-0.90 | 0.30-0.50 | 0.20-0.40 | 0.08-0.15 |
| TS 8132 | Molybdenum | 0.30-0.35 | 0.70-0.90 | 0.30-0.50 | 0.20-0.40 | 0.08-0.15 |
| TS 8135 | Molybdenum | 0.33-0.38 | 0.70-0.90 | 0.30-0.50 | 0.20-0.40 | 0.08-0.15 |
| TS 8137 | Molybdenum | 0.35-0.40 | 0.70-0.90 | 0.30-0.50 | 0.20-0.40 | 0.08-0.15 |
| TS 8140 | Molybdenum | 0.38-0.43 | 0.70-0.90 | 0.30-0.50 | 0.20-0.40 | 0.08-0.15 |
| TS 8142 | Molybdenum | 0.40-0.45 | 0.70-0.90 | 0.30-0.50 | 0.20-0.40 | 0.08-0.15 |
| TS 8145 | Molybdenum | 0.43-0.48 | 0.70-0.90 | 0.30-0.50 | 0.20-0.40 | 0.08-0.15 |
| TS 8147 | Molybdenum | 0.45-0.50 | 0.70-0.90 | 0.30-0.50 | 0.20-0.40 | 0.08-0.15 |
| TS 8150 | Molybdenum | 0.48-0.53 | 0.75-1.00 | 0.35-0.55 | 0.20-0.40 | 0.08-0.15 |
| TS 8155 | Molybdenum | 0.51-0.58 | 0.75-1.00 | 0.35-0.55 | 0.20-0.40 | 0.08-0.15 |
| TS 8160 | Molybdenum | 0.55-0.62 | 0.75-1.00 | 0.35-0.55 | 0.20-0.40 | 0.08-0.15 |
| TS 8165 | Molybdenum | 0.60-0.70 | 0.75-1.00 | 0.35-0.55 | 0.20-0.40 | 0.08-0.15 |
| TS 8615 | Molybdenum | 0.13-0.18 | 0.70-0.90 | 0.55-0.75 | 0.40-0.70 | 0.08-0.15 |
| TS 8617 | Molybdenum | 0.15-0.20 | 0.70-0.90 | 0.55-0.75 | 0.40-0.70 | 0.08-0.15 |
| TS 8620 | Molybdenum | 0.18-0.23 | 0.70-0.90 | 0.55-0.75 | 0.40-0.70 | 0.08-0.15 |
| TS 8622 | Molybdenum | 0.20-0.25 | 0.70-0.90 | 0.55-0.75 | 0.40-0.70 | 0.08-0.15 |
| TS 8625 | Molybdenum | 0.23-0.28 | 0.70-0.90 | 0.55-0.75 | 0.40-0.70 | 0.08-0.15 |
| TS 8627 | Molybdenum | 0.25-0.30 | 0.70-0.90 | 0.55-0.75 | 0.40-0.70 | 0.08-0.15 |
| TS 8630 | Molybdenum | 0.28-0.33 | 0.70-0.90 | 0.55-0.75 | 0.40-0.70 | 0.08-0.15 |
| TS 8632 | Molybdenum | 0.30-0.35 | 0.70-0.90 | 0.55-0.75 | 0.40-0.70 | 0.08-0.15 |
| TS 8635 | Molybdenum | 0.33-0.38 | 0.75-1.00 | 0.55-0.75 | 0.40-0.70 | 0.08-0.15 |
| TS 8637 | Molybdenum | 0.35-0.40 | 0.75-1.00 | 0.55-0.75 | 0.40-0.70 | 0.08-0.15 |
| TS 8640 | Molybdenum | 0.38-0.43 | 0.75-1.00 | 0.55-0.75 | 0.40-0.70 | 0.08-0.15 |
| TS 8641† | Molybdenum | 0.38-0.43 | 0.75-1.00 | 0.55-0.75 | 0.40-0.70 | 0.08-0.15 |
| TS 8642 | Molybdenum | 0.40-0.45 | 0.75-1.00 | 0.55-0.75 | 0.40-0.70 | 0.08-0.15 |
| TS 8645 | Molybdenum | 0.43-0.48 | 0.75-1.00 | 0.55-0.75 | 0.40-0.70 | 0.08-0.15 |
| TS 8647 | Molybdenum | 0.45-0.50 | 0.75-1.00 | 0.55-0.75 | 0.40-0.70 | 0.08-0.15 |
| TS 8650 | Molybdenum | 0.48-0.53 | 0.75-1.00 | 0.55-0.75 | 0.40-0.70 | 0.08-0.15 |
| TS 8653 | Molybdenum | 0.49-0.55 | 0.75-1.00 | 0.65-0.85 | 0.40-0.70 | 0.08-0.15 |
| TS 8655 | Molybdenum | 0.50-0.60 | 0.75-1.00 | 0.55-0.75 | 0.40-0.70 | 0.08-0.15 |
| TS 8660 | Molybdenum | 0.55-0.65 | 0.75-1.00 | 0.55-0.75 | 0.40-0.70 | 0.08-0.15 |
| TS 4130 | Ni and Mo | 0.28-0.33 | 0.45-0.65 | 0.90-1.20 | | 0.08-0.15 |
| TS 4132 | Ni and Mo | 0.30-0.35 | 0.45-0.65 | 0.90-1.20 | | 0.08-0.15 |
| TS 4135 | Ni and Mo | 0.33-0.38 | 0.75-1.00 | 0.90-1.20 | | 0.08-0.15 |
| TS 4137 | Ni and Mo | 0.35-0.40 | 0.75-1.00 | 0.90-1.20 | | 0.08-0.15 |
| TS 4140 | Ni and Mo | 0.38-0.43 | 0.80-1.05 | 0.90-1.20 | | 0.08-0.15 |
| TS 4142 | Ni and Mo | 0.40-0.45 | 0.80-1.05 | 0.90-1.20 | | 0.08-0.15 |
| TS 4145 | Ni and Mo | 0.43-0.48 | 0.80-1.05 | 0.90-1.20 | | 0.08-0.15 |
| TS 4147 | Ni and Mo | 0.45-0.50 | 0.80-1.05 | 0.90-1.20 | | 0.08-0.15 |
| TS 4150 | Ni and Mo | 0.48-0.53 | 0.80-1.05 | 0.90-1.20 | | 0.08-0.15 |
| TS 4012 | Nickel | 0.09-0.14 | 0.75-1.00 | | | 0.15-0.25 |
| TS 4720 | Nickel | 0.17-0.22 | 0.50-0.70 | 0.35-0.55 | 0.90-1.20 | 0.15-0.25 |

*The sulfur content is 0.035-0.050. †The sulfur content is 0.040-0.060.

# PROGRESS IN METALS

**by W. L. Nelson**
Consulting Engineer

## Latest Alternate Steels (A Correction)

THE August 2, 1951, issue of this page of The Oil and Gas Journal carried an item entitled "Alternate Steels During Metal Scarcity." The item and tables offered therein were made obsolete by revisions since January of this year and particularly the revision dated June 13 and a supplement dated July 1951.

The latest American Iron and Steel Institute compositions are indicated in an abbreviated form in Table 1. The latest additions (July 1951) to the list of Alternate Steels are the boron steels designated as the 14BXX and 50BXX series. The boron steels contain a minimum boron content of 0.0005 per cent and the letter "B" is included in the grade numbers. These new steels as well as the Alternate Steels (revised) of June 13, 1950, were adopted primarily for the purpose of conserving nickel and molybdenum. Revisions have been appearing rapidly since January of this year.

Parts of the specifications are the same for all of the Alternate Steels (except as indicated in the footnotes of Table 1):

**Phosphorus and sulfur.**—Maximums:

| | Per cent |
|---|---|
| Basic electric furnace | 0.025 |
| Basic open hearth | 0.04 |
| Acid electric furnace | 0.05 |
| Acid open hearth | 0.05 |

**Silicon.**—0.2-0.35 but the minimum for the acid steels is 0.15 per cent.

**Other elements.**—Small quantities of various other elements are present in alloy steels which are considered as incidental and are not specified or required.

## World Metallurgical Congress

UNDER sponsorship of the A.S.M., American Society for Metals, the metal resources of the world will be discussed by top-ranking metallurgists from the free nations of Europe, Africa, and Asia, as well as from North and South America, when they gather in Detroit, October 14-19, to attend the World Metallurgical Congress, the first international conclave of its kind.

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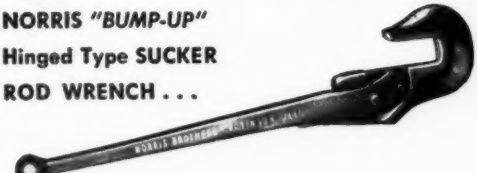

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PETROLEUM RESERVOIR ENGINEERING

than 20 countries will assemble to exchange ideas with thousands of American metallurgists who will participate in the congress, according to Walter E. Jominy of Detroit, staff engineer of Chrysler Motor Corp. and president of the A.S.M., which is sponsoring the world scientific meeting concurrently with the thirty-third annual National Metal Congress and Exposition.

Industrial study tours planned for the visiting scientists and metal executives are being arranged in eight categories of the metal industry, namely: (1) steelmaking and refining; (2) nonferrous refining, rolling, and fabrication (copper, brass, bronze, aluminum, magnesium); (3) ferrous rolling, forging, and hot work in steel mills and heavy industry; (4) stamping, cold work, machining, and finishing in lighter industry; (5) heat treatment; (6) welding and joining; (7) inspection and testing; and (8) research engineering societies and universities. About 150 plants in 13 states and 57 cities are to be visited by the foreign representatives during the month preceding the congress.

In Detroit, visiting conferees will each have an opposite number—an American whose technical, scientific, or business interest closely parallels his own. They will meet in special session in Detroit to exchange ideas and present scientific papers dealing with metals.

## Making Hole Through Thick Conglomerate

*(Continued from page 75)*

to a depth of 120 ft.; 165 sacks are placed behind the pipe.

After a depth of 3,100 ft. is reached, a caliper survey is run. From this survey the volume of cement required for the salt string is determined; this requirement is usually 1,500 sacks. Salt string is comprised of a mixed design of 600 ft. of 9⅝-in. and from 2,200 to 2,400 ft. of 8⅝-in. pipe. If returns are not obtained, a temperature survey is run. If top of cement is 600 ft. or below, holes are perforated in the 9⅝-in. casing and recemented. In cases where cement is near surface, a 1-in. pipe is run down the annulus to the top of the cement and casing is recemented by running slurry through the 1-in. special pipe string.

**Present practice.**—Due to the need to conserve pipe, Shell has experimented with reduction in length of the mixed salt string. Currently, the company sets 600 ft. of 9⅝-in. (as formerly) and only 1,500 ft. of 8⅝-in. which is cemented with 1,200 sacks.

**Long string.**—The long string is now 5½-in. pipe behind which is placed 500 sacks. Slow-set cement with an additive of 4 per cent bentonite and ½ lb. of Flocele per sack is used; the latter is a cellophane additive de-

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signed to prevent loss of cement to formation.

From 600 to 1,400 ft. of centralizers and scratchers is used up to and 100 ft. above the topmost possible productive horizon. The amount of these items used depends upon zone thickness and to a lesser extent upon the structural position of the well.

### Drilling In With Tubing

Since the discovery well of Elk City field, Shell has employed the practice of drilling in with tubing. After setting the long string, drill pipe is laid down; crews pick up a $4^{3}/_{4}$-in. bit which is run on the end of a string of $2^{3}/_{8}$-in. 4.75-lb. J-55 EUE A.P.I. Range 2 seamless tubing. (In some cases N-80 is used).

As much as 200 ft. of cement has been drilled out with 2-in. tubing instead of with drill pipe; this practice has proved to be more economical than using drill pipe.

### NORTHEAST MAYFIELD, OKLAHOMA

Straight-hole drilling through Hoxbar (Pennsylvanian conglomerate) section is exemplified at Carter Oil Co. 1 Cora Garrett, SE SE SE 32-11n-25w, discovery well of the new Northeast Mayfield pool situated west of Elk City field in Beckham County, Oklahoma. Maximum deviation was only $1^{1}/_{8}°$ to $1^{3}/_{4}°$ logged in the section from 5,107-5,629 ft. However, this was corrected to $^{1}/_{2}°$ at a depth of 5,802 ft. Deviation was held to less than 1° and at total depth of 11,100 ft. did not exceed this figure.

**Days to drill.**—The Garrett reached 10,300 ft. in a total rig time of 85 days. Lost circulation was reported at a depth of 5,000 ft. but this problem was quickly solved. Crews increased the mud viscosity from 33 to 40 seconds at 5,039 ft. while weight was held at from 9.3 to 9.4 lb. per gal. at this depth; little rig time was lost due to lost circulation at shallower depths.

**Casing and cementing program.**—Conductor was 16-in. pipe set at 234 ft. The surface string was $10^{3}/_{4}$-in. set at 2,803 ft. Open hole was carried to a depth of 10,297 ft. where the 7-in. long string was set and cemented with 200 sacks. When cement plug was drilled out, diamond core head was run and 803 ft. of section cut, using $6^{1}/_{8}$-in. o.d. core heads.

**Rig equipment.** — Kerr-McGee Oil Industries, Inc., drilling contractor on this well, used its No. 9 rig. It is a Model 75 draw works powered by four GMC Twins delivering a total of 1,200 rig horsepower. A $7^{1}/_{4}$-in. by 18-in. 218-P slush pump works off of the compound and a $7^{1}/_{4}$ by 15-in. C-350 slush pump is powered independently by a GMC Twin. The rig is equipped with a 136 by 30-ft. derrick with a rated capacity of 800,000 lb. (A. P. I. equivalent). Substructure height is 11 ft. 3 in.

In the Pennsylvanian section from 6,855 to 8,647 ft., penetration rates ranged from 5.2 to 11.8 ft. per hour using a C-350 slush pump, 6 and $6^{3}/_{4}$-in. liners with a pump pressure of 750 psig., weight on bit of from 25,000 to 30,000 lb. and a rotary-table speed of 85 r.p.m.

From 8,647 to 10,297 ft., casing point, a C-250 slush pump was substituted, and penetration rates ranged from 4.5 to 7.2 ft. per hour using a 6-in. liner, mud pump pressure of from 800 to 900 psig., a weight on bit of from 25,000 to 30,000 lb. and rotary table speed of only 70 r.p.m.

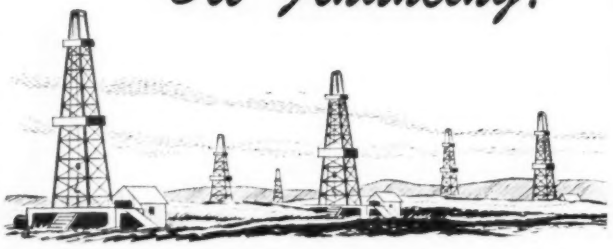
**First offset.**—Carter Oil Co. is drilling below 3,615 ft. in the Wellington (Permian) formation at its 1 A. C. Atwood, SE NW NW 4-10n-25w, at the diagonal southeast offset to the discovery well. This establishes a 40-acre spacing program using the southeast 10-acre spot of each 40-acre tract. Surface pipe was $10^{3}/_{4}$-in. casing set at 2,802 ft.

**FORMATION RECORD—CARTER OIL CO. 1 CORA GARRETT, SE SE SE 32-11n-25w, NORTHEAST MAYFIELD POOL, BECKHAM COUNTY, OKLAHOMA**

(Surface elevation 2,057 ft. d.f.)

| Formation— | Depth, ft. | |
|---|---|---|
| Wellington | 3,163 | (—1,106) |
| Panhandle dolomite | 4,265 | (—2,208) |
| Panhandle lime | 4,416 | (—2,359) |
| Hoxbar formation, (Virgilian) | 6,053 | (—3,996) |
| Hoxbar formation, (Missourian) | 7,232 | (—5,175) |
| Total depth | 11,100 | (—9,043) |


*Thinking of Oil Financing?*



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# Interference Effects in Cathodic Protection

WHEN a structure is placed under cathodic protection, as described in earlier installments of this series, a region of the soil or water in which the structure lies will be carrying current from the anode or anodes to the protected structure. If the resistivity of this electrolyte is uniform, the current distribution is mathematically predictable. Any deviation from uniformity will introduce a corresponding deviation in current distribution.

If a metallic structure lies somewhere within the current-carrying region, and is not itself connected to the system, there is a very real danger that it will intercept some of the current. The collection of current by a metallic structure from an electrolyte does no harm in itself, and at the area of discharge it will destroy the structure.

One ampere of current flowing from a steel surface to an electrolyte will cause the dissolution of 20 lb. of metal per year—which may be extremely serious, or relatively unimportant, depending upon the area over which the loss is distributed and also upon the amount of metal loss required to do serious damage to the structure. As an extreme example, if attack upon a pipe line carrying gasoline is concentrated in a very small area, the loss of a few ounces of metal could well result in a leak costing several hundred dollars to repair—or a fire involving losses in the thousands. On the other hand, a distributed loss of many pounds of sheet steel piling might cause no significant loss of strength.

Any kind of coating on the isolated structure will serve to diminish the amount of current collected and discharged. If the coating is only present in the discharge area, it could aggravate the attack by concentrating it; if the collecting area is coated, however, the total attack can only be diminished.

The extent of interference is also strongly influenced by the orientation of the isolated structure with respect to the protective system. When it lies across the normal flow lines of the current, there will be so little difference in potential between the part nearest the anode and that nearest the cathode that little current will be intercepted; it is when the isolated structure lies more nearly parallel to the flow lines that the hazard is greatest, for this orientation will afford the opportunity for the collection, and inevitable discharge, of much larger currents.

The worst possible orientation offers a large area near the anode, where the current density in the earth is great, combined with a small area very close to the cathode; under these particularly unfavorable circumstances a large current would be collected, and all discharged in a small neighborhood, with resultant heavy attack.

Crosscountry pipe lines, although subject to this type of interference, are relatively easy to control. The simplest method is that of bonding the foreign line to the protected line through an adjustable resistor, and adjusting the value of resistence to a point where the foreign line shows no shift in potential when the protective device is turned on and off. By this means enough protective current is drained from the foreign line to offset the amount collected, and no more.

The most difficult cases to treat are those involving foreign structures within the zone of influence of a protective system installed on a complex network of piping, such as will be found in a refinery, tank farm, or almost any industrial plant area. Water piping, domestic gas service and mains, gage and sample lines, and similar structures may be subjected to heavy damaging currents unless great care is taken in the design and installation of a system.

Frequently alterations and revisions in a piping system will throw a structure into a damaging situation, even when the system was originally designed very carefully. However, unless the small structures thus exposed are carrying fluids which constitute considerable hazard, the inadvertant damage done is frequently more of a nuisance than an expense. A survey of sufficient thoroughness to absolutely guarantee freedom from interference effects can be prohibitively expensive; and the conditions can be remedied, by the installation of resistance bonds, as they make themselves known by failures.

This does not mean that no thought should be given to the matter of interference; it should receive careful study on the part of the corrosion engineer. Major exposures can be avoided by proper placement of anodes; exposures which cannot be wholly avoided can then be corrected by bonding; there will then remain a relatively small number of obscure exposures, to be corrected as they come to light.

The preferred solution, in the case of a system to be installed for the protection of a set of piping or other structures in a restricted area, is that of bonding together **all** of the buried piping and other structures, carefully and completely isolating them from all outside metal, and designing the cathodic protection system to take care of everything. All too often the attempt to protect only one set of piping leads to multiplied troubles elsewhere in the plant.

**Part 29 of a series by Marshall E. Parker, consulting engineer, Houston.**

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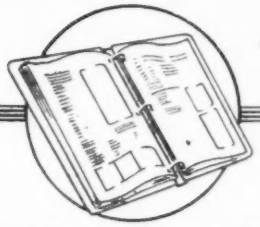

# THE REFINER'S notebook

No. 90

# Further Classification of Refractories

**by Ray A. Witschey***

PHYSICAL properties of refractories as determined by standard tests were outlined in the preceding installment. One property which was not discussed is that of refractory strength.

Refractories are subjected to many stresses such as compression, tension, impact, and abrasion that may occur during handling, transportation, installation, or in actual use. Crushing strength and modulus of rupture are determined at room temperature by A.S.T.M. Method C-133. Crushing strength is that necessary to crush or shear by application of force at two opposite surfaces of a refractory brick or sample. The modulus of rupture is a measure of the transverse strength. It is determined by supporting both ends of a brick, or suitable sample, as a beam and applying the stress or load midway between the supports.

Crushing strength and modulus of rupture tests at high temperature are useful, but no standard has been devised. No standard tests for impact or abrasion have been devised, but considerable work has been done in adapting rattler test methods. Such tests are proving useful.

Further classification of refractories is given in Table I of this installment. A complete tabulation of chemical and physical properties is presented in this table.

The behavior of refractories is based on the destructive actions imposed by the operating conditions. The operating conditions might be summarized as:

1. Confining
2. Heating
3. Stressing
4. Melting
5. Fluxing
6. Disintegrating
7. Spalling

**Confining.**—The primary purpose of refractories is to confine or harness heat, in a properly designed furnace, to make it available for industrial purposes. This requires the services of designer, builder, and contractor, but the utilization of proper refractories makes confining possible. The advances in refractories permit improvements in design and operation, all a function of confining heat.

More on behavior of refractories will be presented in the next installment of The Refiner's Notebook.

*Ceramic engineer, A. P. Green Fire Brick Co. Portion of paper presented at John Zink Heating Seminar, Tulsa, 1951.

**PROPERTIES OF REFRACTORIES**

| | Type of Brick | Composition | P.C.E. or Fusion Point | True Specific Gravity | Approx. Weight in lbs. 9" Brick | Linear Coefficient of Expansion per °C | Thermal Conductivity BTU/Hr./Sq.Ft./in./°F.* | Mean Specific Heat (cgs) | Deformation Under Load 25 #/sq. in. | Constancy of Volume |
|---|---|---|---|---|---|---|---|---|---|---|
| ACID | Silica | $SiO_2$ 95–96% | 31–33 Cone | 2.3–2.4 | 6 | See (A) Below | 13.0 390–1832°F | 0.265 70–1832°F | No deformation at 2732°F, 50psi | Low Shrinkage, Rev.† exp. to Melting Point |
| ACID | High Heat Duty Fire Brick | $Al_2O_3$ 35–42% $SiO_2$ 52–60% | 31–33 Cone | 2.60–2.70 | 7½–8 | 53 x 10 $^{-7}$ 20 – 1200°C | 480–2400°F 9.5 | 0.26 70°–1830°F | 4.0 + % @ 2460°F | 2.0% Shrink. @ 2550°F |
| ACID | Super Duty Fire Brick | $Al_2O_3$ 43–44% $SiO_2$ 51–53% | 33–34 Cone | 2.65–2.75 | 7½–8 | 53 x 10 $^{-7}$ 20 – 1200°C | Approx. same as High Heat Duty | Approx. same as High Heat Duty | 2.5 to 4.0% @ 2460°F | 1% Max. Shrink at 2732°F |
| ACID | High Alumina Fire Brick | $Al_2O_3$ 50–80% | 34–39 Cone | 2.80–3.40 | 8–9 | 53 – 65 x 10 $^{-7}$ 20 – 1425°C | Slightly more than High Heat Duty | Approx. same as High Heat Duty | Approx. same as Super Duty | 0–3% Shrink. @ 2912°F |
| ACID | Kaolin | $Al_2O_3$ 44–45% $SiO_2$ 51–53% | 31–34 Cone | 2.60 | 7½–8 | 53 x 10 $^{-7}$ 20 – 1425°C | 13.5 @2400°F | 0.254 480–1832°F | 1% @ 2800°F | 0.5% Shrinkage @ 3000°F |
| ACID | Mullite | $Al_2O_3$ 62% $SiO_2$ 38% | 38 Cone | 3.03 | 8½ | 45 x 10 $^{-7}$ 20 – 1320°C | 8.5 200–2600°F | 0.175 70°–1475°F | 0 @ 2650°F., 50 psi; 2.0% @ 3000°F, 50 psi | No appreciable change to 3000°F |
| ACID | Zircon | $ZrO_2$ 67.1% $SiO_2$ 32.9% | approx. 4400°F | 4.6 | 12 | 42 x 10 $^{-7}$ 20 – 1550°C | 13.5 390°–1832°F | 0.132 100°F | Fails @ 2820°–2910°F | No appreciable change to 2820°F |
| ACID | Silicon Carbide | SiC 89–91% | dissoc. @4082°F | 3.13–3.22 | 9.5 | 45 x 10 $^{-7}$ 20 – 1100°C | 66.0 @2000°F | 0.186 70–1832°F | No deformation to 2732°F, 50 psi | No Shrinkage to 2732°F |
| NEUTRAL | Graphite | C 100% | above 5432°F | 2.25 | 8 | 20 x 10 $^{-7}$ 20 – 1000°C | 220. @ 2000°F | 0.29 70–1832°F | None | No Shrinkage |
| NEUTRAL | Chrome | $Cr_2O_3$ 30–45% $Al_2O_3$ 15–33% $SiO_2$ 11–17% FeO 3–6% | 3550–4000°F | 3.8–4.1 | 11 | 80 x 10 $^{-7}$ 20 – 1000°C | 12.1 @2400°F | 0.22 @ 1832°F | No deformation @ 2600°F | 1.3% Shrinkage at 2820°F |
| NEUTRAL | Fused Alumina | $Al_2O_3$ 90–99.1% | 38–41 Cone | 3.80–4.00 | 11 | 70 x 10 $^{-7}$ 20 – 1000°C | 18.0–20.0 @ 2000°F | 0.174–0.304 32°–1832°F | 1–2% @ 2732°F, 50 psi | No Shrinkage at 2732°F |
| BASIC | Forsterite | MgO 57.3% $SiO_2$ 42.7% | 40 Cone | 3.3–3.4 | 9 | 110 x 10 $^{-7}$ 20 – 1500°C | 10.3 @ 2400°F | 0.22 70–200°F | No deformation to 2732°F, 50 psi | Negligible Shrinkage to 3000°F |
| BASIC | Magnesia-Alumina Spinel | MgO 28.2% $Al_2O_3$ 71.8% | 3875°F | 3.6 | 10 | 80 x 10 $^{-7}$ 20 – 800°C | 14.5 @ 2400°F | 0.25 70–1832°F | | |
| BASIC | Magnesite (Dead Burned) | MgO 83–93% $Fe_2O_3$ 2–7% | 3992°F | 3.4–3.6 | 9½ | 147 x 10 $^{-7}$ 20 – 1425°C | 13 2400°F | 0.278 70–1832°F | Poor load bearing property above 2450°F | No Shrinkage below 2900°F |
| BASIC | Magnesia (Electrically fused) | MgO 94–96% $SiO_2$ 2–3% CaO 1–2% | 3992–4532°F | 3.60 | 10 | 150 x 10 $^{-7}$ 20 – 1475°C | 20.0 2000°F | 0.292 32–2375°F | Poor load bearing property above 2732°F | Less than 1% below 3250°F |

* To change BTU units to C.G.S. units divide by 241

(A) 430 x 10 $^{-7}$, 20 – 360°C, 30 x 10 $^{-7}$, 360 – 1100°C

† Reversible

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**Write for Bulletin 306. It describes the principle and construction of the device . . . your own ingenuity will undoubtedly suggest places where it can solve some problem for you.**

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# Wettability and Flood Calculations

THE calculation of a flood front based upon relative permeability should be affected by the wetting properties of the porous material being flooded because wetting properties change the form of the relative-permeability curve. The present discussion will outline the variation in flood-performance calculations due to wetting.

The basic equations are those developed in Engineering Fundamentals Nos. 457-460. The water saturation at the flood front is that which satisfies the equation:

$$\mu_o/\mu_w + k_o/k_w = S_w\, d(k_o/k_w)/dS_w \quad (1)$$

with the condition that there is zero water saturation ahead of the flood front. When there is a water saturation ahead of the flood front but the water is immobile, the water saturation at the flood front is that which satisfies the equation:

$$\mu_o/\mu_w + k_o/k_w = (S_w - S_{wi})\, d(k_o/k_w)/dS_w \quad (2)$$

where $S_{wi}$ is the connate water ahead of the flood front.

For the conditions of no connate water, the total remaining water saturation at flood breakthrough is given by:

$$\text{Per cent water saturation} = (S_w/f_w)_x \quad (3)$$

where x designates flood-front conditions. When connate water is present, the total water saturation at flood breakthrough is given by:

$$\text{Per cent water saturation} = [(S_w - S_{wi})/f_w]_x + S_{wi} \quad (4)$$

It is generally accepted that when the relative wettability of a porous medium shifts completely from water wet to oil wet, the relative-permeability curves shift. Therefore Fig. 1 is used to describe the relative permeabilities in both a water-wet and oil-wet system. A set of relative-permeability curves similar to this for a water-wet system has been given in the literature.[1] If the role of water and oil are interchanged in this system by making a change of wettability the $k_o/k_w$ value demanded for Equations 1 and 2 will change considerably.

Figs. 2 and 3 show the plots of $k_o/k_w$ versus $S_w$, first considering a water-wet system and then an oil-wet system. Also plotted on these figures are the products of saturations and $d(k_o/k_w)/dS_w$ used in Equations 1 and 2.

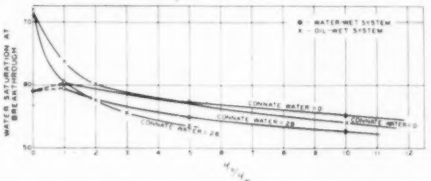


*Fig. 4—Variation of water saturation at breakthrough.*

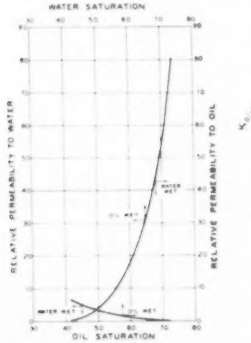


*Fig. 1—Relative-permeability curves for water-wet and oil-wet systems.*

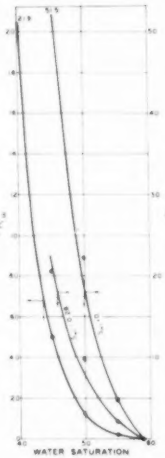


*Fig. 2—$K_o/K_w$ for water-wet system. (Data from Fig. 1.)*

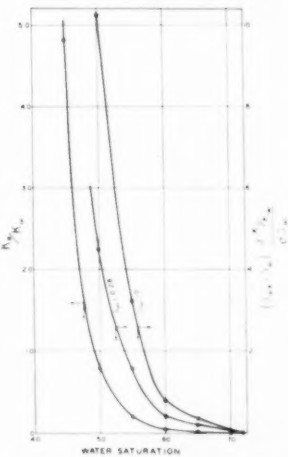


*Fig. 3—$K_o/K_w$ for oil-wet system. (Data from Fig. 1).*

Using Figs. 2 and 3 the water saturations at the flood fronts were found for different values of $\mu_o/\mu_w$ and water saturations at breakthrough were calculated, both with and without connate water. A connate water value of 28 per cent was used for both the water-wet and oil-wet system.

Fig. 4 shows results of the calculation. The water-wet system shows a much smaller dependence of water saturation at breakthrough on viscosity ratio. Another way of interpreting Fig. 4 is to point out that most of the production on the water-wet system will be before breakthrough, with hardly any production during the secondary or "tailoff" phase. Per cent recovery of oil in per cent of pore space at water breakthrough is given by the water saturation at breakthrough less connate water. Per cent recovery during the secondary phase is given by the breakthrough value at zero $\mu_o/\mu_w$ less the water saturation at breakthrough.

For the oil-wet system, the secondary phase is indicated to be much larger than for the water-wet system. The most rapid change in breakthrough saturation is found in the low-oil-viscosity region.

This dependence on wettability is qualitatively equivalent to that reported in the literature where descriptions of flooding on oil-wet and water-wet systems are made.[2]

It is apparent, aside from wetting considerations, that the effect of viscosity ratio on breakthrough saturation depends on how rapidly the $k_o/k_w$ values increase. This is seen in Equations 1 and 2 and in Figs. 2 and 3. The latter show in one case $k_o/k_w$ values going only to 5 and in the other case to 20.

### References

1. Morse et al., Relative Permeability Measurements on Small Core Samples, Prod. Monthly, Aug. 1947.

2. Kinney and Nielsen, Role of Wettability in Oil Recovery, Bulletin No. 54, MI Experiment Station, The Pennsylvania State College, 1949.

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**6 AIR COMPRESSORS.** A new 12-page, 2-color catalog presents a complete study, by means of illustrations, drawings, and specifications of 35 air-cooled compressors generally recommended for industrial use, in a wide variety of sizes and types ranging from 1 to 90 cu. ft. per minute. *Quincy Compressor Co.*

**7 VERTICAL INDUCTION MOTORS.** A new four-page bulletin gives data on ratings, construction, and types of vertical, solid-shaft, induction motors, available in ratings upwards from 60 hp. to 200 r.p.m. *Allis-Chalmers Manufacturing Co.*

**8 NICKEL ALLOY PIPE AND TUBING.** Technical Bulletin T-17 contains 27 illustrated pages of drawings and photographs on the fabrication and design of nickel and high-nickel-alloy pipe and tubing. It also presents tables on mechanical and physical properties, A.S.M.E. code requirements, recommended welding procedures, and other information. *The International Nickel Co., Inc.*

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ed, as well as a variety of actual installations. *Link-Belt Co.*

**10 ENGINEERED INDUSTRIAL FLOORS.** New 12-page illustrated catalog points out why the installation of industrial floors for maximum life and minimum cost requires experienced planning, skilled technical execution, and exacting cost control, and describes how floors can be engineered to withstand moving and deadweight loads, shock and vibration, extremes of temperature, oils, greases, and chemical and industrial wastes. *Flash-Stone Co., Inc.*

**11 SPECIAL HEAVY-DUTY ELECTRICAL EQUIPMENT.** A 24-page, profusely illustrated brochure outlines the part played by Leece-Neville as a pioneer in the field of electrical equipment for diesel, gas, and gasoline engines. Pictorial sections are shown on production, assembly, testing, and engineering facilities. *The Leece-Neville Co.*

**12 DIFFERENTIAL CONVERTER.** A mercuryless flow meter, featuring fast speed of response for flow control and continuous range change adjustment from 0-20 to 0-200 in. of water, is described in a 16-page catalog. Operating principles, as well as construction features, typical applications, detailed specifications, and installation methods are covered. *Minneapolis-Honeywell Regulator Co.*

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**14 PRESSURE VESSEL CATALOG 501** is a 118-page informative book on pressure vessel outlets, and includes data on seamless-steel nozzles, welding necks, manways, and large-diameter flanges for boilers, heat exchangers, and other pressure vessels. *Taylor Forge & Pipe Works.*

**15 pH MEASUREMENT AND CONTROL.** A 24-page bulletin describes automatic, continuous measurement and control of pH in industrial processes. Complete specifications are given on glass and calomel electrodes in several different models for both immersion and flow uses. Bulletin also contains illustrations and descriptions of various applications. *The Bristol Co.*

**16 BLOWOFF VALVES.** Bulletin B-425 gives up-to-date information on blowoff valves in two types for working steam pressures up to 400 psi. Valve-selection tables and price lists are included. *Yarnall-Waring Co.*

**17 OIL WELL DIESEL DRILLING UNITS.** Publication 1246 is a 19-page booklet describing oil-well power units ranging from 98 to 725 hp., with engines available in either normally aspirated or turbocharged form. Illustrations, specifications, dimensions, and performance figures are given. *Davey, Paxman & Co. Ltd.*

**18 PETROCARBON SERVICES,** a 16-page illustrated booklet outlines the activities of Petrocarbon, Ltd., who designs, develops, engineers, and builds oil refineries and plants for the production of chemicals from oil and other raw materials. *Petrocarbon Ltd.*

**19 CENTRIFUGAL BLOWERS AND COMPRESSORS,** a 51-page illustrated bulletin, contains comprehensive data on multistage, single-stage, end suction and single-stage double-suction compressors. Capacities range from 1,000 to 150,000 cu. ft. per minute for pressures to 150 psi. and above. Application and engineering data are included. *De Laval Steam Turbine Co.*

**20 AUTRONIC CONTROL SYSTEM** as the first miniature all-electronic system for controlling pressure, temperature, flow, and level is described in Bulletin A-701, which is printed in two colors and illustrated with photographs, line sketches, dimensional drawings and a schematic diagram showing principle of operation. *The Swartwout Co.*

**21 TWO-ZONE PUMP** is a four-page bulletin describing two-zone subsurface pumps for dually completed wells and the method of simultaneously pumping both zones without using additional tubing, sucker rods, or surface equipment. Colored schematic drawings illustrate flow courses and installations, and the text describes design and construction, operating principle, and how the pumps are set. *Otis Pressure Control, Inc.*

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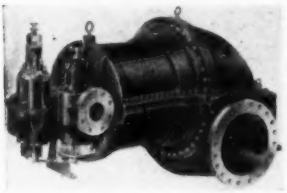
**by Dan B. Miller**

**22 MULTISTAGE MECHANICAL-DRIVE STEAM TURBINE LINE.** In ratings from 200 to 5,000 hp. and designated as Types DP, DR, DRV, and DRVX, the new units have been designed to cover a wide range of industrial applications, as well as for power-generation purposes. The Type DP turbine, rated from 200 to 3,000 hp., is designed for driving pumps, compressors, fans, blowers, and similar equipment. Type DR turbine, rated from 200 to 5,000 hp., is built for applications requiring wider speed range, greater accuracy of control, and greater capacity than can be obtained from the Type DP turbine. It has a speed range up to 6 to 1, with only 4 per cent regulation and ½ per cent steady state speed variation. Type DRV, rated from 200 to 5,000 hp., has the governing characteristics of the DR multistage turbine, but utilizes automatic sectional valves linked to the oil relay governor. Type DRVX is designed for applications where process steam is desired at a definite, steady pressure. *General Electric Co.*



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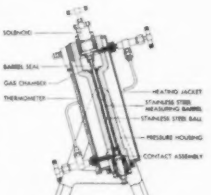


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**24 NEW ROD ELEVATOR.** For fast, safe handling of sucker rods and polished rods, without danger of kinking, distortion, or dropping the string, these elevators are streamlined, with no protruding latches. The rod seats are accurately machined to fit the contour of the rod; they are properly balanced to suspend the rod string vertically; and the forged ball is reinforced at the top where extra strength is needed. Elevators are instantly reversible, and in service the rod enters easily into the throat of the elevator where it is automatically locked in place and can be released only when the latch is opened by the operator. The latches can be operated from either front or rear for added convenience. The door of the elevator is spring-loaded so that if the latch is not properly closed the rod is pushed out of the throat of the elevator and will not be picked up. Combination sizes are available for ⅝ to ¾-in., ¾ to ⅞-in. and ⅞ to 1-in. rods, each of 20-ton capacity with ample safety factor. *Web Wilson Oil Tools, Inc.*

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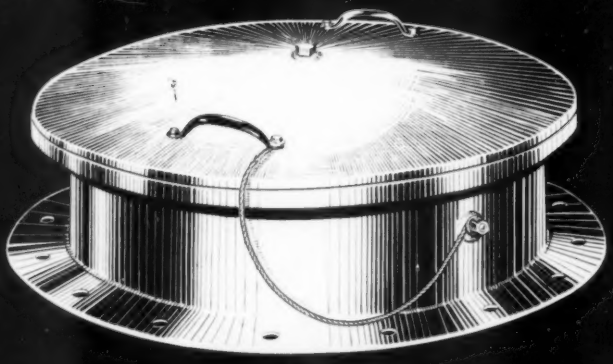

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diator guard and combination cable and sheave group. The trunnions are included in the weight box and frame group. This group is a substantial assembly, fabricated of heavy structural steel plate mounted in conjunction with the DW10 tractor frame. The heavy-duty weight box and frame group not only provides support for the bulldozer trunnions at each side of the tractor, but includes a heavy box at the rear of the tractor to accommodate four counterweights. They are offered separately as an attachment. The counterweight box is designed with a tow hitch, so that the tractor can also be used for drawbar purposes. *Caterpillar Tractor Co.*

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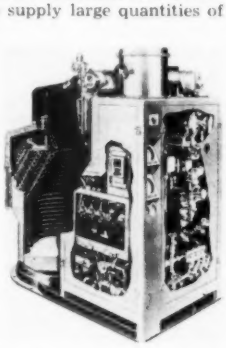
**26 VAPOR-CLARKSON STEAM GENERATOR MODEL 4740** was developed to supply large quantities of high-pressure dry steam. This powerful steam generator develops 200 lb. steam pressure in 2 minutes from 50° cold water and produces 4,800 lb. of 99 per cent dry steam per hour, 82 per cent efficient. It uses No. 2 fuel oil for fuel, the forced-draft air and pressure-atomized fire releases a million B.t.u. per cubic foot of combustion space. The hot gases wipe over the 702 ft. of steel coil, turning water pumped through the coil into steam. One electric motor (or gasoline engine on portable units) drives the water pump, fuel pump, blower, and magneto. Once started, by turning one switch, automatic controls take over causing the machine to turn on and off and produce steam only when steam is needed. Steam pressure may be changed from 75 to 600 psi. by turning one control. *Vapor Heating Corp.*



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**27 TEL-O-SET CONTROLLER.** A new instrument that provides sensitive, instantaneous and accurate control of flow, temperature, pressure, liquid level, and other industrial-process variables is the latest component in a series of new devices designed to improve process control. The other components of the group are the differential converter, Tel-O-Set indicator and Tel-O-Set recorder. The controller was developed for use with the other three components. The controller operates on a pneumatic-balance principle which eliminates friction and lost motion. The new model is made in two types, one with fixed proportional band, the other with adjustable proportional band. The units are constructed of interchangeable sections separated by diaphragms. Except for manual adjustments of reset on the band unit, the Tel-O-Set controllers operate wholly in response to pneumatic signals. *Minneapolis-Honeywell Regulator Co.*

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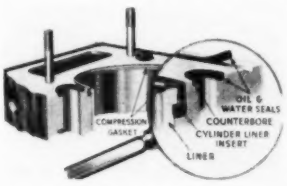


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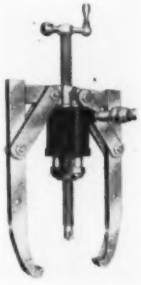
**29 HOLSTER FOR U-V INSTRUMENT** is for convenience in field use of the Menlo Fluoretor, and similarly shaped instruments. Designed for attachment to the user's belt, this case accommodates the complete instrument including the dark chamber which permits fluorescence detection and comparison under daylight conditions. The Fluoretor folds and swivels instantly into position for operation after removal from the holster. *Menlo Research Laboratory.*

IT'S NEW CHECK IT

**30 POWER-TWIN HYDRAULIC PULLER.** Only slight changes are necessary to change over OTC Pullers Nos. 1003L, 1003½, and 1003½-L to fast operating hydraulic power to make them even more effective and efficient and to increase their range of utility. The versatile Power-Twin puller speeds up the work, eliminates torque and takes the hard work out of all pulling jobs. It's safer, too, because of the remote-control feature. The ram can easily and quickly be detached from the Grip-O-Matic Puller and used just as effectively on OTC Push-Pullers or on a bench or pedestal press. *Owatonna Tool Co.*

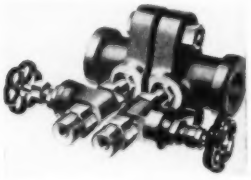


IT'S NEW CHECK IT

**31 IDEAL DY-A-FLEX.** A new drum-type air clutch is now standard equipment on five drilling rigs, in one to three positions. Field replacements have been made on the drum shafts of Ideal Types 50, 75, and 100 draw works that were originally equipped with clutches other than the Dy-A-Flex. Friction shoes are independent, removable assemblies designed for induced cooling by air circulation through light metal construction. They can be removed individually and need not be disassembled for lining replacement. In operation the shoes are urged radially inward against the friction drum by a ring-shaped, molded-rubber diaphragm, which is the inside wall of a ring-shaped air chamber of very small air capacity. The latter assures quick application and release, and minimizes air consumption. Air pressure in the chamber flexes the diaphragm inward. When air pressure is released, retrieving leaf springs completely disengage shoes and drum. Centrifugal force further contributes to the releasing action. *National Supply Co.*

IT'S NEW — CHECK IT

**32 VISCOUS-FLUID FLOW MEASUREMENT.** The PL orifice, which is available in two forms, gives a coefficient of discharge which is unaffected by wide variations in the viscosity of the fluid passing through it. The PL orifice plate is made of stainless steel and is designed and made to give the required differential pressure at the specified maximum flow. This differential pressure is transmitted to the recorder by way of two connecting pipes, using seals if necessary. The thickness of the orifice plate varies from 1/16-in. upwards, according to the diameter of the pipe. The two forms may be used for either horizontal or vertical pipes. The two forms are: An orifice plate to be clamped between existing flanges of the oil pipe-line; and a self-contained carrier unit, as shown in the illustration. This comprises a carrier, the orifice plate, and cocks. *George Kent, Ltd.*

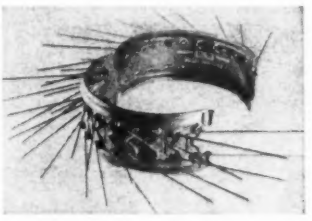


IT'S NEW — CHECK IT

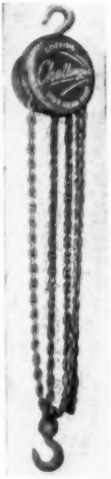
**33 HYDRAULIC WIRE-LINE GUIDE** reduces wire-line wear by hydraulically absorbing whip and lash as line spools on and off draw works drum at high speeds. It allows the line to spool evenly at highest speeds, preventing drum crushing, dog legs, and line kinking. Hydraulic action is quickly and easily adjustable to suit any drilling requirement. A long-lasting, low-cost plastic insert in the guide head is replaceable in 5 minutes. The guide will not wear or strip lubricant from line. Fits all standard or jackknife rigs. Bolts on easily without any drilling or welding. *Collins Engineering Corp.*

IT'S NEW — CHECK IT

**34 B AND W NU-COIL SCRATCHER.** A heavier base and window type hinge are combined with a high tensile spring curved pin. This scratcher is of the latch-on type and is adapted to installation on external upset casing or on casing joints on which the welded scratcher stop lugs are placed in the casing storage yard or on the dock before moving to a marine location. Another important usage is on small drill-pipe stingers for cement plug placement on open hole. These assemblies may be dressed at the rig location, without welding service. *B & W Inc.*



IT'S NEW — CHECK IT



**35 SPUR-GEAR HOIST** is now in production in ½ and 1-ton capacities. The entire unit, including standard length of high-strength coil chain for an 8-ft. lift, weighs 39½ lb. Strength and unusual resistance to shock-load breakage is gained by the use of formed-steel plate in the housing. The back plate is laminated to give extra rigidity for supporting the hoist mechanism. This plate and all other load-holding parts are of high-strength steel that will hold many times the rated capacity of the hoist. Hoist is tested at 100 per cent overload. *Coffing Hoist Co.*

IT'S NEW — CHECK IT

**36 NEW PROCESSING PUMP.** A new oil-lubricated bearing, pedestal-mounted pump is for handling chemicals, liquors, corrosive materials, and solutions, hot liquids, and petroleum. The liquid end of the pump is a complete self-contained unit. It can be had in stainless steel, monel metal, nickel, or other special material when used for pumping liquids which would attack iron or bronze. Two sizes of pedestal assembly cover the entire range of pump sizes available in capacities to 1,200 g.p.m. at heads to 250 ft. and temperatures to 500° F. *Allis-Chalmers Manufacturing Co.*

IT'S NEW — CHECK IT

# NATURAL GAS

## Lion Oil's Plans for New Ammonia Plant Strike Snag

CHARLOTTE, N. C.—Lion Oil Co.'s plans to build a $30,000,000 plant near here for the production of anhydrous ammonia from natural gas have hit a snag.

The company has been informed by Piedmont Natural Gas Co., prospective natural-gas supplier, that it is impossible for Piedmont to supply the 15,000,000 cu. ft. of gas daily which the plant would require.

Lion officials said that prolonged negotiations are unavoidable. The company, headquarters in El Dorado, Ark., has already received authority from the Defense Production Administration to write off 50 per cent of the cost of the plant in 5 years. The rapid tax amortization applied to $30,452,000.

Charlotte's chamber of commerce is energetically engaged at present in trying to assist Lion in possible negotiations with Transcontinental Gas Pipe Line Corp. for the needed gas.

## Munitions Board Urges FPC to O.K. Imports From Canada

BILLINGS, Mont.—The federal Munitions Board has recommended that Montana Power Co. be permitted to import Alberta natural gas to insure an adequate fuel supply for production of vital defense minerals by Anaconda Copper Mining Co.

The recommendation came in the form of a letter from J. D. Small, board chairman, to the Federal Power Commission examiner in charge of the hearing here on Montana Power's application.

The letter went into the record over objections of Thomas J. McGrath, attorney for the coal interests who are waging an active campaign to defeat any importation of natural gas. The FPC examiner said, however, that the letter would not be used as evidence.

The hearing is now in its second week *(The Oil and Gas Journal, September 27, page 351)*.

## July Sales Up 14.6 Per Cent

NEW YORK.—Sales of natural gas in July continued the bigger-than-last-year trend with a figure of 2,907 million therms.

This is an increase of 14.6 per cent over the 2,537 million therms sold in July 1950, according to statistics compiled by the American Gas Association.

For the 12 months ending May 31, sales totaled 42,235 million therms, a gain of 17.2 per cent over the equivalent period a year ago. A.G.A.'s index of July sales was 348.6 per cent of the 1935-39 average.

# Natural Gasoline

## Construction to Start Soon On New Plant at Elk Hills

LOS ANGELES. — Construction of a new 50,000-M.c.f. natural-gasoline plant to serve the Elk Hills Naval Petroleum Reserve in San Joaquin Valley is expected to be under way by early November.

Contract for the plant, which will cost in the neighborhood of $5,000,000, has been awarded Parsons-Macco Co., Los Angeles. Work on a new 100-mile gathering system is scheduled to start in the next few weeks.

While initial capacity will be 50,000 M.c.f. daily, the plant has been designed so that it can readily be expanded to 100,000 M.c.f. through installation of additional compressor and absorption capacity. Standard Oil Co. of California, operator of the Elk Hills Unit, is supervising the plant's construction.

## Program Arrangements for C.N.G.A. Meeting Completed

LOS ANGELES.—The program for the twenty-sixth annual fall meeting of the California Natural Gasoline Association October 4-5 has been completed.

According to L. V. Cassaday, chairman, the meeting will get under way October 4 with a group of technical forums. The second day will be taken up with a general session.

The forums are designed for plant operators, process engineers, chemists, and management, Cassaday said. They include sessions on maintenance, covering engines and compressors; processing, discussions of economics and application of cooling equipment plus fat-oil rectification; corrosion, covering cathodic protection, engine and compressor-cylinder corrosion.

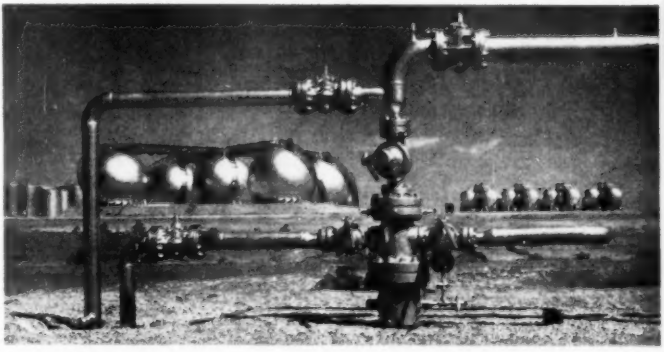
The general session will present subjects of interest to the national gas and gasoline industry in relation to national defense.

## New Plant for Texas-Harvey Field Coming From Michigan

MIDLAND.—The gasoline plant to be constructed near here in the Tex Harvey field by Tex-Harvey Gasoline Plant, Inc., and Anchor Gasoline Corp. will be moved from Reed City, Mich., it has been announced.

The plant will be located in Section 14, Block 37, T-3-S, in Tex Harvey field about 15 miles from here. Operation of the plant is scheduled to begin on January 1 at a processing rate of about 25,000,000 cu. ft. of gas daily. Ultimate capacity is planned at 50,000,000 to 60,000,000 cu. ft. daily through the addition of a recently developed refrigeration process.

Cost of the plant and of a gathering system in the field to carry gas has been estimated between $5,500,000 and $6,000,000.



***MORE TO IT.**—This shot of an L.P.G.-injection well and pressure-storage area falls into somewhat the same category as a sailor's view of an ice berg—you only see a small part of the whole. The big portion lies underground. The well is Scurry Unit No. 1 injection well of its three-well, 3,700,000-gal.-capacity project adjoining the unit's natural-gasoline plant in Scurry oil field, West Texas. Initial recovery from this well was 91 per cent of L.P.G. injected despite the interbedded nature of a 600-ft., Permian section of salt, red beds, insoluble anhydrite, and shale. More than 25,000,000 lb. of salt dissolved in 198,000 bbl. of fresh water was injected to create the shallow storage cavern. The top of the cave is only 630 ft. below the surface. Sunray Oil Corp. is unit operator.*

**WANTED**

**PRODUCTS**
**for manufacture or sale**
**to the oil industry**

Old established company, now manufacturing devices for oil field use, with office in Tulsa and representatives traveling Mid-continent and Texas fields, would consider additional products for manufacture and sale for oil field, refinery or pipe line use. Plant located adjacent to excellent water shipment facilities for domestic and export trade.

**Would also consider** acting as sales agency for manufacturers of oil field equipment.

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**Tulsa, Oklahoma**

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PARKERSBURG MACHINE COMPANY
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# Among the Drilling Contractors

## Five Contract Rigs Busy In New Red Wash Field

Five contract rigs are now running in the new Red Wash field, in Uintah County, northeastern Utah, where The California Co. is stepping up its development program. Latest additions are two rigs just moved in by Kerr-McGee Oil Industries, Inc., Oklahoma City, and which now are drilling for the above operating company at 8 Unit, C SW NE 22-7s-23e, and 9 Unit, C NE SE 23-7s-23e.

Loffland Brothers Co., Tulsa, which contracted the discovery well, has three rigs in the field. They currently are on the above operator's 3 Unit, C SW SE 23; 5 Unit, SE NE NE 23; and 7 Unit, NE NE NE 27. Loffland has completed three wells, Nos. 1, 2, and 4 Unit. Production in the field ranges in depth from 5,200 ft. to below 5,700 ft.

**Dorris Ballew, Inc.**, Natchez, Miss., will drill for Calto Oil Co. and Associates at 1 Ward, a projected 6,500 ft. wildcat test in 55-7n-2w, northeast of Natchez, in Adams County, Mississippi.

**Roeser & Pendleton, Inc.**, Fort Worth, is drilling on a 10,000-ft. test contracted for Sun Oil Co. in Hancock County, Mississippi. Location is on the Whitfield-Weston unit, 3½ miles west of Santa Rosa, in the C NE NW 22-7s-16w.

**Perl Smith**, Newcastle, Wyo., has taken a contract for a 6,000-ft. test which F. E. Pohle and associates have projected for the Ash Creek prospect in Haakon County, South Dakota. Location is in 16-4n-18e.

**Glasscock Drilling Co.**, Shreveport, is moving in rig for another test to be drilled for Hunt Oil Co. and associates in the Dismal Swamp area, 3 miles west of Slocum, Concordia Parish, Louisiana. The new wildcat, projected to 7,500 ft., is 2 Dale, C SE SW 42-4n-8e.

**Gabbert & Jones Drilling Co.**, Wichita, is drilling for Deep Rock Oil Corp at 1-B State, NE SE NW 19-8n-50w, a projected 5,000-ft. Morrison sand exploratory test in the Sterling area, Logan County, Colorado.

**Creighton Drilling Co.**, Tulsa, contractor on Cummings-McIntyre's new Wilcox sand discovery well (1 Combs) near Pond Creek, Grant County, Oklahoma, is moving its rig to an offset location northeast of the discovery well where it will continue drilling for the same operators. The new test will be 1 Sherman with location in the NW SW NW 5-25n-5w.

**W. B. Hinton**, Dallas, contracting for A. O. Phillips, is starting a 9,500-ft. wildcat test 5 miles southeast of Gilmer in the W. H. Williams Survey, Upshur County, eastern Texas.

**Rainbow Drilling Co.** and Sam Richardson, both of El Dorado, Ark., are the contractors on two new wells scheduled for the East Schuler field, Union County, Arkansas. The former will drill for Curtis Kinard at 1-B Burns, NW NW SE 13-18s-7w, and the latter for Lion Oil Co. at 1 Cottrell, ¾ mile to the southwest, in the NE SW NE 23.

**H. J. Uhl Drilling Co.**, Wichita, is starting a 3,400-ft. test for **Mercury Drilling Co.**, Tulsa, at a wildcat location 1½ miles southeast of the Northeast Uncas pool, 3 miles east of Uncas, Kay County, Oklahoma. Location is on the latter's Thompson lease in the NE NE NW 28-27n-4e.

## B & R Drilling, Inc Russell, Kans.

ONE of the leading drilling contractors in Kansas, B & R Drilling, Inc., had its inception in a partnership formed August 1, 1941, by C. L. Roberts and H. C. Bennett. The partnership, operating under the name of B & R Drilling Co., was dissolved April 1, 1947, when the firm was incorporated under its present name.

*C. L. ROBERTS*

**Organization.** — Original participants in the incorporation included Roberts, who was elected president; Bennett, vice president; Larry Froelich, treasurer; and Clara Hummel, secretary. Shortly after the

# Baash-Ross News

BAASH-ROSS TOOL COMPANY • LOS ANGELES • HOUSTON • OKLAHOMA CITY • NEW YORK

OUR 32nd YEAR

Baash-Ross "DU" Long Rotary Slips

You can **See** it in the Design!
**Feel** it in the Handling!
**Check** it on the Scales!

## BAASH-ROSS "DU" ROTARY SLIPS ARE UNUSUALLY LIGHT WEIGHT

Stop and think how many dozens of times the rotary slips are lifted by the drilling crew during a *single* round trip. Multiply this by repeated day-after-day, month-after-month operations and you can readily appreciate why light weight is such an important factor to look for in rotary slips. *And you really get light weight in Baash-Ross "DU" Rotary Slips!*

For example, check these figures on typical sizes of "DU" Slips . . .

| Size of "DU" Rotary Slips | "DU" Regular (12" long) | "DU" Long (16" long) |
|---|---|---|
| 4½" O.D. Slips with 4¼" Liners | 135 lbs. | 158 lbs. |
| 5⅝" O.D. Slips with 5⅜" Liners | 143 lbs. | 177 lbs. |
| 7" O.D. Slips with 7" Liners | 152 lbs. | 196 lbs. |

On these and other sizes you'll find Baash-Ross "DU" Rotary Slips are pounds lighter because all excess metal has been removed without in any way sacrificing strength or ruggedness. *Notice the deeply-cored backs that replace dead metal with a cellular rib construction that combines more-than-ample strength with minimum weight.*

▶ **But most important** is the fact that unusually light weight is only *one* of many important advancements you get in Baash-Ross "DU" Rotary Slips. Carefully check through the features outlined below . . . compare them right down the line with *any other* make of slips . . . and you'll see why "DU" Rotary Slips are today's outstanding buy for maximum convenience, safety and all-around economy!

Baash-Ross "DU" Rotary Slips are available in both "Regular" length (12" long—for wells through 8000 ft. in depth) . . . and "Long" length (16" long—for the deepest wells and heaviest drill strings). For full details, see your nearest Baash-Ross representative—or write direct!

## WHAT OTHER SLIPS COMBINE SO MANY OUTSTANDING ADVANTAGES?

▶ **3 BODY SIZES FIT 14 PIPE SIZES:** With "DU" Slips you don't need a separate slip for each size of drill pipe. By simply changing the liners—a quick inexpensive operation—three basic "DU" body sizes fit *all* sizes of tubing, drill pipe and casing from 2⅜" O.D. through 7" O.D. Cuts slip investment and maintenance to a minimum!

▶ **MONEY-SAVING SEGMENTED LINERS:** "DU" Slip Liners are in 4" segments instead of single long units. If you use both 12" and 16" Slips there's no need to stock liners for both sizes. Simply keep a supply of 4" segments on hand—use three 4" segments for 12" Slips . . . four 4" segments for 16" Slips . . . thus greatly reducing inventory costs. Also, if for any reason slip wear is concentrated at one point, liner segments can be switched or inverted to distribute wear without replacing any parts. Or if too worn, replace only the worn segments and use the others for additional service. Cuts maintenance costs to the bone!

▶ **SELF-ALIGNING HINGE:** "DU" Body Segments are not merely hinged together, but are unitized by a unique "floating" hinge that prevents vertical misalignment, yet permits them to adjust laterally to any irregularities in bore of master bushing. This assures a full, uniform grip under all conditions!

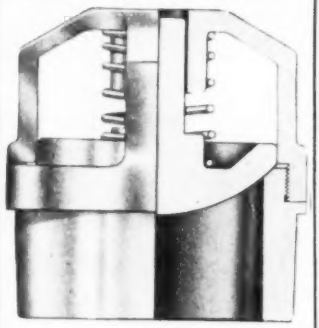
▶ **SAFETY LINER RETENTION:** "DU" Slips are so designed that all stresses—both of supporting the pipe and of breaking out joints—are transmitted directly from the liners to the slip body. There are no retaining bolts or pins to become sheared and allow liners to fall into hole. Yet liner segments can be quickly removed by simply pulling a cotter and sliding out one keystone retaining key. This double keystone key firmly mates liners and body into single rigid unit!

▶ **AND OTHER ADVANTAGES:** There are still other vital "DU" advantages . . . the safety loops on the handles that safeguard crew's hands against injury . . . the polished backs that eliminate sticking in the bore . . . the perfected grip design that will not damage the pipe . . . the flattened toes that enable "DU" Slips to stand solidly on table or floor . . . and many other unique features.

**BEFORE YOU BUY ANY ROTARY SLIPS GET THE COMPLETE STORY ON "DU" ALL-AROUND SUPERIORITY!**

**HERE IT IS---**

**If you prefer an All Metal Valve — L-K Style No. 106**



No heavy wing guides to obstruct the flow or wedge in Valve Seat. Lightweight, strong, foolproof. Seat and valve of file hard, alloy steel, ground and lapped in, cage of bronze or steel. Spring controlled, smooth performance. Try it and be convinced that it is the smoothest and most economical pump valve you have ever used.

*Write for detailed information.*

**L-K Pump Valve Co.**

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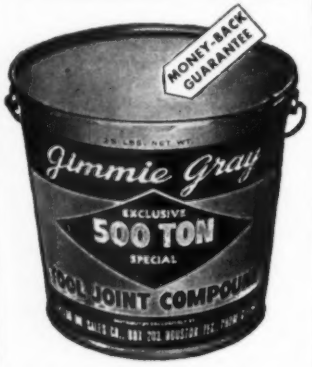


1. **EXCLUSIVE 500-TON SPECIAL** prevents washouts and galling. **Makes breaking out easier; withstands highest pressures, and is unaffected by heat and moisture!**
2. **KANT-GALL TOOL JOINT COMPOUND**
3. **LONG-LIFE DRILL COLLAR COMPOUND**

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incorporation was formed, on June 28, 1947, E. L. McCartney purchased one-fourth interest in the firm, and on April 15, 1950, was elected second vice president. Effective February 8, 1950, Froelich resigned as treasurer and was succeeded by Harold Wurst.

**Rigs.**—Eight rotary rigs are being operated by the firm. These range in depth capacity ratings from 3,500 ft. to 6,000 ft.

**Operations.**—During the latest fiscal year, 1950, the firm drilled 215 wells with a total footage of 642,920 ft. Most of its operations have been along the Central Kansas Uplift through mid-western Kansas and extending northwestward into southern Nebraska. In addition to its contracting business, the firm has drilled numerous wells for its own account and operates a number of producing properties.

**Rine Drilling Co.,** Wichita, is drilling for Lion Oil Co. at 1 Davidson, SE NE NE 7-1n-56w, a wildcat in the South Fort Morgan area, 6 miles south of Lea field, Morgan County, Colorado, Contract is for 5,700 ft.

**Austin Stewart Drilling Co.,** Shreveport, has a rig working for Skelly Oil Co. at 1 Wurtzbaugh, NE NE NE 25-19n-11w, a newly started 4,000-ft. Pettit test in the East Bellevue field, Webster Parish, Louisiana.

**D. E. Vasser** is the contractor on a projected 7,500-ft. wildcat test which R. A. Campbell is starting a half mile southeast of Ashland, Concordia Parish, Louisiana. Location is for 1 Sharp, in 16-4n-9e.

**Lewis & Mucher** are drilling for T. T. Eason & Co. at 1 Kafka, a projected 4,900-ft. wildcat test, located in the SW SW SE 13-23n-2w, about 5 miles southeast of Billings, Noble County, Oklahoma.

**Morton Drilling Co.,** Casper, Wyo., is starting a 3,400-ft. test for Northern Ordnance Co. in the Dry Piney area of Sublette County, Wyoming. The new operation is at 1 Michelson, NE NE SE 4-29n-113e.

## ACTIVE ROTARY RIGS*

(United States and Western Canada)

| Area— | Week ended 9-17-51 | Change week ended 9-10-51 | Change week ended 9-18-50 |
|---|---|---|---|
| Gulf Coast | 595 | —13 | + 85 |
| W. Tex.-N. M. | 972 | —24 | +226 |
| Ark.-N. La.-E. Tex. | 176 | + 1 | + 33 |
| Oklahoma | 310 | + 5 | + 47 |
| Kansas-S. Nebraska | 164 | —15 | + 13 |
| Illinois-Eastern | 153 | + 4 | + 31 |
| Rocky Mountains | 192 | + 5 | + 71 |
| Pacific Coast | 186 | + 2 | + 43 |
| Total United States | 2,748 | —35 | +549 |
| Western Canada | 150 | — 7 | + 49 |
| Total | 2,898 | —42 | +598 |

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the Gulf Coast and Arkansas-North Louisiana-East Texas areas are shown on pages 154 and 155.

**Barbour Drilling Co.,** Tulsa, contractor on Gulf Oil Corp.'s new discovery well, located 22 miles southwest of Kimball, Kimball County, western Nebraska, is moving its rig to the north offset location to be drilled for the same operator. The new test is 1 Miller, in C SW SW 7-12n-58w. The discovery well, 1 Sisson, produces at a total depth of 7,431 ft.

**Sterling Drilling Co.,** Sterling, Kans., will drill Lario Oil & Gas Co.'s first test in the Denver-Julesburg basin. It will be a wildcat in the Blessing area, Washington County, Colorado, with location in SE SW NE 10-1s-54w. Contract is for 6,500 ft.


*Business in* **TULSA** *means—*

**THE MAYO**

★ Air Conditioned ★ Centrally located ★ Adjoining Garage ★ Coffee Shop

*The Oil Man's Hotel in The Oil Capitol of The World*



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NO-SMOKE

**STANDCO BRAKE LINING**

Stands the gaff and gets the job done without scoring brake rims. See pages 3608-3613, Composite Catalog.

**Standco Brake Lining Co.**
HOUSTON

*Special Train to the*
*A.P.I. Convention in Chicago*

# A. P. I. SPECIAL

**LEAVE TULSA** *FRISCO* **5:30 PM Nov. 4**
**ARRIVE CHICAGO** *GM&O* **8:00 AM Nov. 5**

Pullman equipment consists of bedrooms, roomettes, drawing-rooms and compartments . . . Lounge and dining service.

For those planning to attend advance committee meetings, we suggest through sleeping car service on the streamlined Meteor which leaves Tulsa 9:45 pm and arrives Chicago 2:08 pm.

For Frisco reservations and information concerning hotel facilities in Chicago . . .

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**First National Building, Tulsa 3, Okla.**

FRISCO GM&O

Special train returning will leave Chicago 4:40 pm, November 8th; arrive Tulsa 8:00 am, November 9th.

**Rig Runner RECORDS**
**AN AUTOMATIC DRILLING REPORT**

"The Traveling Block Tells the Story"

The position and rate of movement of the traveling block are recorded by RIG RUNNER. This record allows every detail of rig operation to be known and to be studied. RIG RUNNER operates continuously; there is neither clutch nor level—simply wind the clock. RIG RUNNER does the rest, giving all the facts accurately and impartially—including automatic rate of penetration.

**FOR GEOLOGISTS**

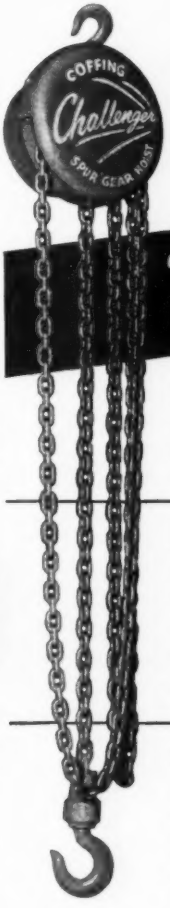
Automatic rate-of-penetration record—Bottom of hole shown accurately at all times—Reaming clearly distinguishable from drilling of new hole—Perfect record of off bottom circulating for samples.

**FOR ENGINEERS**

Automatic record of running casing—Time study of each joint run and time for filling casing with mud—Record shows pipe being reciprocated while pumping cement plug to bottom —Number of joints indicated clearly at all times.

WARREN AUTOMATIC TOOL CO.
1920 HUSSION ST. HOUSTON, TEXAS

**NEW**




# Coffing Challenger

*What you have been waiting for in a Spur-Gear Hoist*

**Light Weight**

**Carry it with one hand.** One-ton model, with coil chain for standard lift of 8 ft., weighs only 38 lb.

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# PIPE LINES

## Oklahoma Contracting to Finish Eastern Job Soon

The Northeastern Gas Transmission Co. project for building the initial lines in Massachusetts contracted by Oklahoma Contracting Co., will be finished about October 10. All of the 160 miles of 24-in. main line has been completed and only 35 miles of the 94 miles of laterals, ranging from 3 to 16-in., remain to be completed.

This lateral work is near Woburn, Franningham, Tewksbury, and Lawrence, Mass. Contractor's operations are directed by W. H. Law, vice president.

Oklahoma Contracting Co. expects to put two and perhaps three spreads in the field for work expected to start in October and November on Gulf Southern's contract with United Gas Pipe Line Co. Gulf Southern is a joint venture of several contractors, in which Oklahoma Contracting Co. participates.

Spread equipment will be moved soon from Falfurrias, Tex., to an 86-mile, 30-in. line from Pierce, Tex., for United Gas Pipe Line Co. A field office is being established for this job at Edna, Tex. This contract is in addition to the 1,000-mile program contracted by Gulf Southern.

Paul Halbert, vice president of Oklahoma Contracting, is directing work on a Tennessee River crossing for Texas Eastern Transmission Corp., subcontracted from Brown & Root, Inc.

## Work to Start Soon on Ohio Oil's "Big Inch"

Construction will begin soon on the final link of Ohio Oil Co.'s "big inch" crude-oil pipe line from Wood River, Ill., to Lima, Ohio.

Conyes Construction Co. will lay 117 miles of 22-in. from Sheridan, Ind., to Lima. Work will be finished late this year so the line can be put into service early next year.

A new pump station at Patoka, Ill., is to be finished in November and the 20-in. western link from Wood River to Martinsville, Ill., will then have a capacity of 180,000 bbl. daily, while the 22-in. link will have a potential capacity of 250,000 bbl. daily.

Deliveries will be made at Lima to other pipe lines for refineries in

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*MODERN MACHINES AND ELBOW GREASE.—Pipe lining has been greatly facilitated by machines like this giant ditcher, but it still takes human sweat and elbow grease. Here two members of a Houston Contracting Co. pipe gang follow along a 6-ft. trench axing off protruding tree roots in the wake of the ditcher. Operation is on Tennessee Gas Transmission Co.'s new 30-in. loop line under construction in northern Harris County, Texas.*

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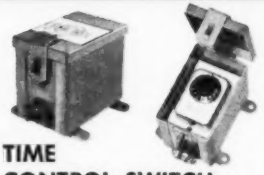

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Ohio, Michigan, Pennsylvania, New York, West Virginia, and Canada, or continue through Ohio's system to the Ohio-Pennsylvania line for delivery to the Atlantic Coast.

## United Fuel's West Virginia Pipe-Line Facilities O.K.'d

WASHINGTON.—The Federal Power Commission has authorized United Fuel Gas Co., Charleston, W. Va., to construct about 45 miles of natural-gas-transmission line and other pipeline facilities in West Virginia.

The new construction in Putnam and Kanawha counties will enable the company to expand further its underground-gas-storage facilities.

In addition to the pipe line, United will build a 2,640-hp. compressor station together with a dehydration plant, auxiliary units, and other equipment near Lanham, W. Va. In addition, the company will transfer a 1,000-hp. gas-engine unit from its Walgrove compressor station to the Kanawha station. Estimated over-all cost is $4,755,830.

United now has 10 storage pools in depleted gas fields along the route of its transmission lines. It plans to acquire and activate three more pools in Putnam and Kanawha counties. The new construction will permit the storing of more gas underground in order to meet peak loads during the winter. United Fuel is an affiliate of Columbia Gas System, Inc.

## West Texas Gulf Places Big Equipment Order

PITTSBURGH. — West Texas Gulf Pipe Line Co. has placed an order for about $1,160,000 worth of electrical equipment with Westinghouse Electric Corp. for installation on the company's big 550-mile crude trunk line from West Texas production to the Texas Gulf Coast refining area.

The equipment is for the three initial pump stations to be installed at Colorado City, Ranger, and Wortham, Tex. It includes 47 motors ranging up to 2,000 hp., together with switch gear, control equipment, and auxiliary transformers.

Gulf Oil Corp., Sun Oil Co., Standard Oil Co. (Ohio), Pure Oil Co., and Cities Service Oil Co., all participants in this biggest domestic crude-oil carrier, will pipe crude from their production to Colorado City. The oil will be carried through the 26-in. portion of the line to Wortham at a maximum throughput of 300,000 bbl. daily. From there it will travel through 24-in. to Sour Lake at a maximum throughput of 200,000 bbl. daily.

Included in the project are plans to build an 18-in. lateral from Wortham to Longview in East Texas to tie in with Mid-Valley Pipeline

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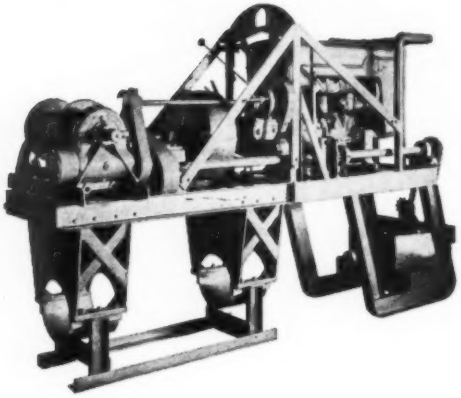

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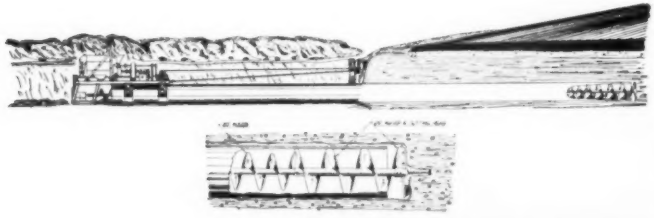

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Co.'s system terminating at Lima, Ohio.

Operator for the big common carrier is Gulf Oil Corp., owner of more than 50 per cent of the stock. The project has been authorized by the Petroleum Administration for Defense *(The Oil and Gas Journal, August 30, page 103)*.

## F.C.C. Issues Construction Permits for Radio Facilities

WASHINGTON.—Construction permits for 41 stations and units and for 75 mobile units have been issued by the Federal Communications Commission to companies for various pipeline-communications operations.

Companies receiving permits, together with types of communications units to be built, include:

**Texas Eastern Gas Transmission Co.**, three fixed relay stations near Bound Brook, N. J., using 1,880, 1,930, and 1,980 mc.; one base station each near Bound Brook and Siloam, Ky., using 49.94 mc.; one fixed relay station each, near Stricklett, Jackson, and Garrison, Ky., using 1,880, 1,930, and 1,980 mc., and two fixed control stations each at Linden, N. J., and near Wheelersburg, Ohio, to operate on 1,880, 1,930, and 1,980 mc.

**Interstate Oil Pipe Line Co.**, four base stations—one at Lindsay, Okla., to operate on 158.31 mc. and the other three at Frannie, Wyo., Silvertip, Mont., and Billings, Mont., to operate on 153.29 mc.; and 25 mobile units to operate on 153.29 mc.

**Manufacturers Light & Heat Co.**: Control station near Ellerslie, Md., to operate on 75.82 mc., and a repeater station near Frostburg, Md., to operate on 72.18 mc.

**Mississippi River Fuel Corp.**, two base stations to operate on 48.82 mc. near Athens, La., and Woodlawn, Tex., respectively, and two control stations near Minden and Perryville, La., plus one repeater transmitter near Athens, to use either 75.82 or 72.42 mc.

**New York State Natural Gas Corp.**, base station near Petersburg, Ohio, to operate on 48.70 mc.

**Colorado-Wyoming Gas Co.**, for three additional units and the replacement of six units to operate on 37.74 mc. in Colorado and southern Wyoming.

**Kansas-Nebraska Natural Gas Co., Inc.**, for nine additional units at Holcomb, Kans., on 37.50 mc.

**Southern Natural Gas Co.**, for one base station near Riverdale, Ga., operating on 49.06 mc.

**Tennessee Gas Transmission Co.**, for one base station near Grand Chenier, La., to operate on 33.26 mc.

**Arkansas Louisiana Gas Co.**, for 30 mobile units operating on 30.82 mc. in Texas, Louisiana, and Arkansas.

**Peoples Natural Gas Co.**, for one base station near Altoona, Pa., and 20 mobile units operating on 158.19 mc.

## Pipe-Line Briefs

**Cities Service Gas Co. will begin** construction soon of a 26-in. line over recently secured right-of-way to replace a 10-mile section of the St. Joseph and Kansas City, Mo., 16-in. line south from Ottawa, Kans. Three main engine blocks and all of west and south walls of company's main building at Greensburg, Kans., compressor station have been completed. All residences are nearly completed and some grading work finished. Well houses have been completed and materials for the main building received.

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1—1949 Chevrolet suburban with heater

1—1949 Chevrolet Bus

2—1948 Chevrolet 1½ ton flat bed trucks with winches

3—1950 Chevrolet 2 ton flat bed trucks with winches

5—1950 Chevrolet ½ ton pick-ups with heaters

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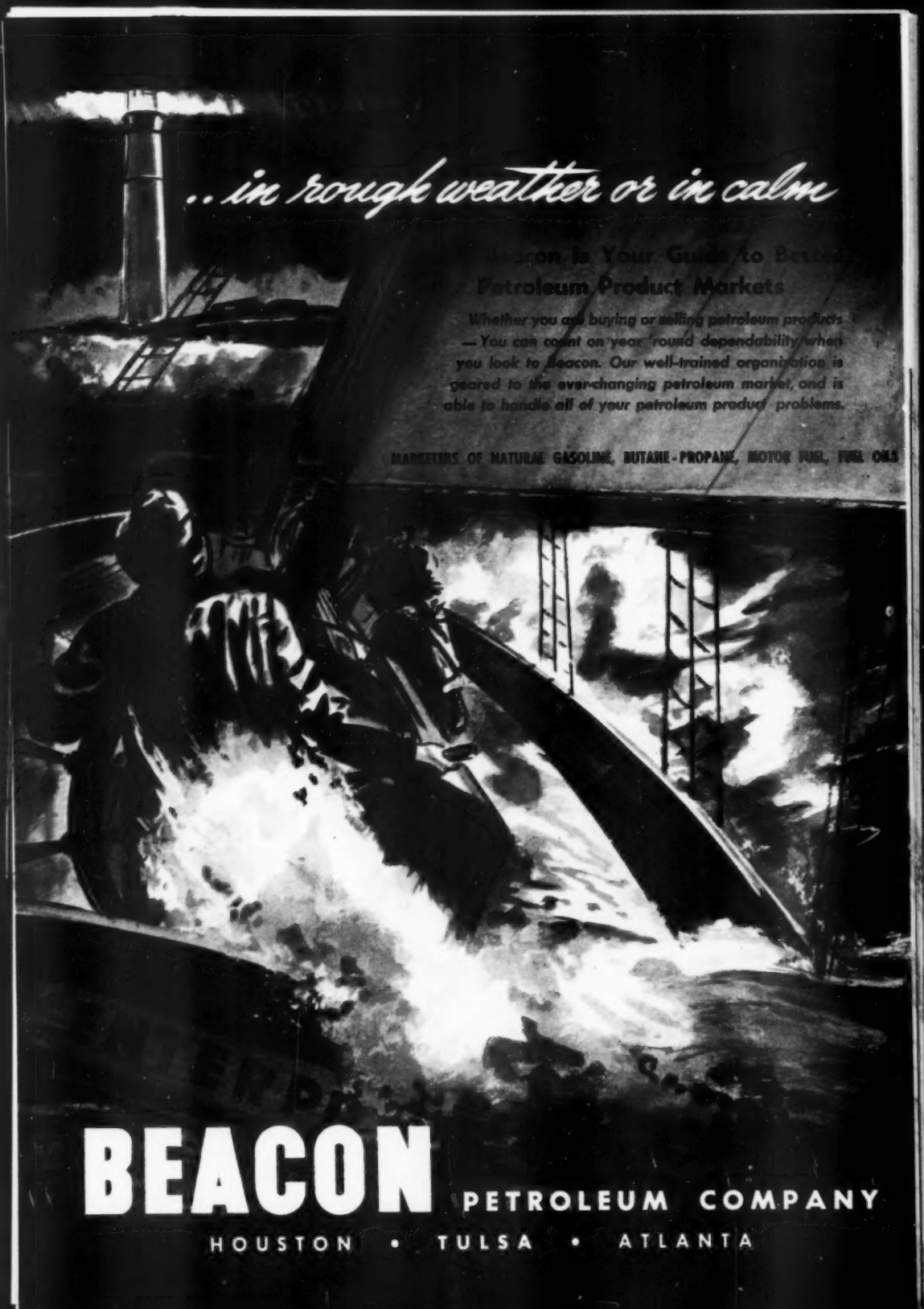
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# REFINING

## New Petrochemical Firm to Build Big Plant in Texas

HOUSTON.—Alamo Chemical Co., a new venture, has been issued a certificate of necessity by the Defense Production Authority authorizing a fast tax write-off of 50 per cent of a new $38,260,000 petrochemical plant on the Houston Ship Channel.

Alamo is reportedly backed by Phillips Chemical Co., General Aniline & Film Co., and Borden Co. So far the three firms have released no details on the project.

The new plant, planned location for which lies near Phillips Chemical's ammonium-sulfate plant on the channel, will produce anhydrous ammonia. It is reported that Alamo has retained a large engineering firm to determine potential of the plant.

## Indiana Standard Adding Sulfur-Production Plant

CHICAGO.—Standard Oil Co. (Ind.) has begun construction of a sulfur-extraction and manufacturing unit at its Whiting, Ind., refinery which will produce about 55 tons of elemental sulfur per day.

The new plant will extract hydrogen sulfide from byproduct fuel gases produced in the refinery and convert it to 99.9 per cent pure sulfur. The plant, now being built by Fluor Corp., Ltd., Los Angeles, is scheduled to go into full operation about the middle of next year.

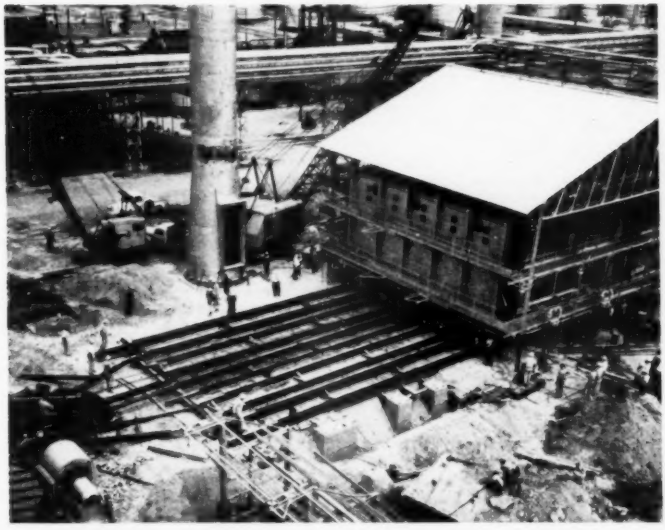
Most of the Whiting sulfur production will be processed to sulfuric acid for use in the refinery's alkylation and treating operations.

## Heavy Fuel-Oil Demand Can Be Met, Socony Official Says

SARANAC, N. Y.—A Socony-Vacuum executive said last week that fuel-oil producers' facilities will be strained to the uttermost to meet the increased demand this winter, but that all needs can be handled if normal weather prevails.

Leroy B. Fox, manager of fuel-oil sales for Socony, told the New York State Fuel Merchants Association, Inc., that reserve and new refining capacity can meet the demand despite greater military demands and the world-oil emergency created by the shutdown of the Anglo-Iranian plant at Abadan.

Fox said that since 1940 domestic demand for the distillate class of products has risen nearly twice as fast as the demand for gasoline owing to the increase in the number of oil



*FURNACE SKIDDING.—A new furnace moves quickly into position at Magnolia Petroleum Co.'s Beaumont refinery. This short-cut method is used by Lummus Construction Co. to save shut-down time when replacing furnaces. The new furnace was built off site, and all connecting lines made ready. Then the old furnace was removed and the new one moved into position intact.*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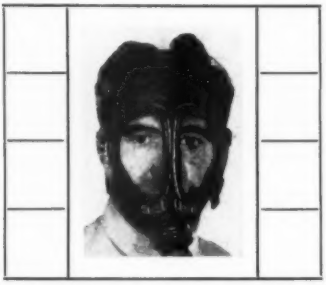

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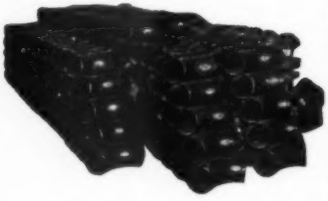

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burners in use and the turn to diesels on railroads.

The result is that refiners now have two primary products instead of one, he said.

## Union Plans Longer Wharf To Accommodate New Tanker

Work shortly will be started on an extension to Wharf A at Union Oil Co.'s Oleum refinery near here. The wharf is to be extended from 432 to 576 ft., at an estimated cost of $270,000. When completed it will be able to accommodate a new Union tanker scheduled for delivery early next year.

Union plans to christen its big new tanker, Santa Maria, in mid-November. The $5,000,000 vessel will be the largest and fastest ever built for Union. It will carry 143,000 bbl. of oil at a cruising speed of 15.4 knots.

The big oil carrier is the third Union "Santa Maria." Its two predecessors, but much smaller and slower, were sold, and the first was later sunk during World War I.

## Moose Jaw Refinery Sold

MOOSE JAW, Sask.—Trans-Empire Oils, Ltd., has purchased the refinery owned by Moose Jaw Oil Refineries, Ltd., and will take over operations of the plant some time in September.

The refinery has a daily processing capacity of 1,300 bbl. of crude. It has been supplying diesel oil to the railways, bunker fuel to National Light & Power Co. here, and light-end products to British American Oil Co.

## Shell Lets Plant Contract

TORONTO.—Shell Oil Co. of Canada, Ltd., has let contract to C. F. Braun & Co. for construction of the new $3,000,000 petrochemical plant at Shell's Montreal East refinery site. Preliminary construction is now in progress. On completion the plant will produce isopropyl alcohol and acetone, utilizing propylene gas from the light-ends-treating plant at the refinery.

## Refining Briefs

**Shell Oil Co. officials said an explosion** at the company's Wood River, Ill., refinery, which killed 12 men and hospitalized 18 others, does not appear to have caused serious property damage. A flash fire following the blast was brought under control in about 30 minutes and extinguished in an hour. Cause could not be determined immediately. It occurred in one of the refinery's cracking units, Dubbs No. 17, which had been closed down for cleaning. Glenn Cunningham, plant superintendent, said an intensive investigation had been initiated.


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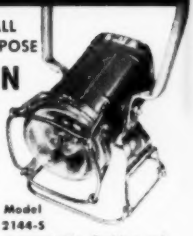

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# Western Kansas' Mississippian

THE sparsely tested Mississippian rocks which lie on an erosional shelf on the eastern limb of the Hugoton embayment of the Anadarko basin immediately west of the Central Kansas uplift are gradually being recognized as offering much greater potentialities than have heretofore been acknowledged.

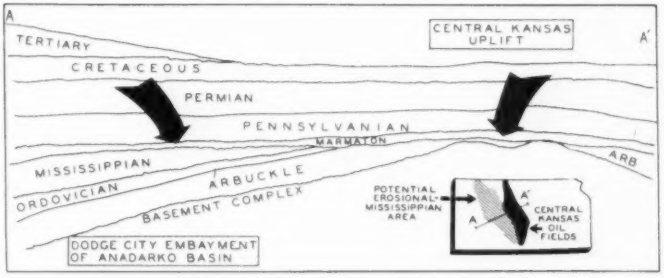
It is true that the history of Mississippian tests in this area has been very disappointing. The Mississippian rocks have been found to be water bearing in most of the wildcats that have tested them. Only a few small oil pools, all of which produce excessive quantities of water with the oil, have been found in the Mississippian to the west of the Central Kansas uplift. Offsets to promising discovery wells have frequently been dry or very poor producers.

However, when compared to the size of the area under consideration (see location map), the number of Mississippian tests have been very few and results to date should not be considered indicative of the entire area. Certainly there is not a sufficient concentration of dry holes to condemn the area.

To develop the "theory" behind the idea that the Mississippian rocks may some day be producing oil along trends that will stretch northwest-southeast across Kansas to the west of the Central Kansas uplift, let's take a look at the Arbuckle, the most prolific producer in Kansas.

These old rocks have reservoired oil in eroded beds across the Central Kansas uplift. It must be assumed that these rocks, which were subjected to erosion for millions of years and which are underlain by basement complex, could not now be carrying oil that was indigenous to Arbuckle or any rocks below it—that the oil had to come from overlying beds, which in this case were Pennsylvanian shales and limestones. One fact that favors this assumption is that oil is also found in weathered basement rocks across the uplift where Pennsylvanian strata lie in direct contact with them.

If oil accumulated in the Arbuckle came from overlying Pennsylvanian rocks, it appears reasonable to expect that oil from the Pennsylvanian would also accumulate in other porous rocks that underlie it directly. The eroded Mississippian rocks to the west of the Central Kansas uplift offer just such a trap. (See cross-section).




*Diagrammatic cross-section showing comparable relationship of Marmaton and other Pennsylvanian formations to erosional surface of Arbuckle and Mississippian rocks.*

During the long period of erosion that took place between the deposition of the Mississippian and the Pennsylvanian-Marmaton, the Mississippian was cut away from the area of the Central Kansas uplift. The surface of the Mississippian limestones was subjected to weathering for a long period of time as evidenced by the development of excellent porosity at the unconformable contact with the Marmaton. Thus there is a similarity of reservoir rock with the Arbuckle, with an identical source and identical capping rock, the overlying Pennsylvanian in both cases.

It is not anticipated that any tremendous pools will be discovered on the eroded Mississippian shelf but rather that development will eventually establish production comparable to the spotty but widespread Arbuckle production on the arch.

This means that a great many 4,000 to 5,000-ft. holes are going to have to be drilled but not that the search will have to depend on random drilling. Through the use of detailed seismic work the topography of the erosional Mississippian surface can be contoured. Topographic highs, if found to have porosity (which is more likely than not), should be ideal conditions for oil pools in the Mississippian and in the detrital Marmaton which will be draped over the high.

*Philip C. Ingalls.*

## HIGHLIGHTS OF WEEK'S DEVELOPMENTS

**ROCKY MOUNTAIN AREA.**—Two wildcats in the Colorado portion of the Denver-Julesburg Basin had oil shows. Lario Oil & Gas Co. 1 Blessing and Lion Oil Co. 1 Davidson both tested stains in the "D" sand. Shows of oil in the Embar were found by Stanolind Oil & Gas Co. at the Coon Creek wildcat, 1 Pepper, in Big Horn County, Wyoming. Current Williston Basin wildcats are drilling ahead and testing with no important developments at last report.

**PERMIAN BASIN.**—El Tee 1 Briley, Dawson County Pennsylvanian oil strike, 11 miles northwest of Lamesa, flowed 735 bbl. of 40°-gravity oil per day. In Gaines County, Union Oil Co. completed its 2 Weltner for 99 bbl. of 47°-gravity oil per day from the Clear Fork. This discovery is 7 miles south of East Hobbs field and 2 miles east of House field in Lea County, New Mexico.

# North Central Texas

## Deep Strawn Sand Pay Found in Baylor County

WICHITA FALLS.—The first deep Strawn sand discovery for Baylor County is in prospect. J. J. Lynn 1 First National Bank, 10 miles east of Seymour, recovered 1,350 ft. of free oil and 30 ft. of heavily oil-cut mud with a slight taste of salt water on a 1-hour drill-stem test from 4,747-52 ft.

In the southwest part of the same county, Frank Woods Associates will drill a 4,700-ft. wildcat 6 miles southeast of Bomarton. It is 1 W. H. Portwood, 2,148 ft. from the west line and 4,304 ft. from the north line of Block 184, W. R. Dickenson Survey A-142.

Sinclair Oil & Gas Co. 1 S. F. Murrell opened a Strawn sand pool in Cooke County 3 miles southwest of Coesfield. The discovery flowed 382 bbl. of 44°-gravity oil through a ½-in. choke and perforations from 3,692-3,706 ft.

A second pay section in the Pennsylvanian was indicated at Seaboard Oil Corp. and others 1 Hanks, Nolan County wildcat 7 miles northeast of Blackwell. On a 2-hour drill-stem test of the Strawn from 5,418-36 ft. there was gas in 15 minutes, and recovery was 1,410 ft. of oil and 90 ft. of heavily oil and gas-cut mud. On a drill-stem test in the reef from 4,584-4,609 ft., flowing production was estimated to be 15 bbl. an hour.

Leland Fikes et al, 1 Clifton Good, Stonewall County wildcat 3 miles south of Old Glory, was drilling ahead at 6,065 ft. after a 3-hour drill-stem test of the conglomerate from 5,982-90 ft. recovered 765 ft. of gas and 45 ft. of oil-cut mud.

Engle Petroleum Co. 1 Frank Collier, 6 miles northeast of Montague, showed gas to the surface in 35 minutes and recovered 550 ft. of oil, 350 ft. of oil and water-cut mud, and 3,170 ft. of salt water on a 90-minute drill-stem test from 4,270-81 ft.

In Haskell County, Deep Rock Oil Corp. 1 Jenkins, wildcat 3 miles southeast of O'Brien, recovered 60 ft. of oil and 130 ft. of heavily oil and gas-cut mud in 150 minutes on a drill-stem test from 4,837-64 ft. On the next test from 4,872-4,900 ft., with tool open 1 hour, recovery was 58 ft. of heavily oil and gas-cut mud.

**NORTH CENTRAL TEXAS (DISTRICTS 9 & 7-B) SUCCESSFUL WILDCATS**

Archer County: J. C. Man, Jr., 1 W. R. Ball, Blk. 14, W. L. Herring Sur., A-168, 5 mi. W Antelope, TD 3,833 ft., Strawn perf. 3,800-03 ft., pumped 13 bbl. 42°-gravity oil day.

Coleman County: Bishop Oil Co. 1 W. H. Davis, Blk. 11, T&NO Sur., ¼ mi. SW Glen Cove, TD 3,371 ft., elev. 1,989 ft., perf. 3,354-67 ft., Jennings 3,355 ft., flowed 156 bbl. 42°-gravity oil day, 12/64-in. choke, GOR 650 cu. ft., TP 100 psi., CP 600 psi.

Jones County: W. E. Butler 2 G. B. Triplett, Blk. 201, J. J. Hughes Sur., TD 2,292 ft., elev. 1,727 ft., perf. 2,264-84 ft., flowed 168 bbl., 38°-gravity oil day, ½-in. choke, GOR 75 cu. ft., TP 75 psi.

W. A. Monerief, C. E. Groover, and B. C. McBride 1 W. E. Winkles, Lot 3, J. M. Smith Sur. 3, 2 mi. SW luegers, TD 1,697 ft., pay 1,690 ft., pumped 80 bbl. 38°-gravity oil day, GOR 375 cu. ft.

Montague County: Standard Oil of Texas 1 J. S. Etter, Sec. 12, MEP&P Sur. 8-522, 4½ mi. SE Nocona, TD 5,821 ft., elev. 975 ft., conglomerate 5,775 ft., pay 5,772 ft., flowed 1,518 bbl. 41°-gravity oil day, ½-in. choke, GOR 813 cu. ft., TP 775 psi., CP 800 psi.

Throckmorton County: Woodson Oil Co. 8-A RR. A. Brown Unit A, Sec. 929, TE&L Sur., 5 mi. NW Woodson, TD 4,337 ft., PB 4,179 ft., elev. 1,322 ft., pay 4,057 ft., perf. 4,054-62 ft., flowed 75 bbl. 41°-gravity oil day, 20/64-in. choke, GOR 1,250 cu. ft., TP 500 psi., CP 825 psi.

Young County: Warren Oil Corp. 1 Nash-Daniel Unit, TE&L Sur. A-844, 5½ mi. SW Murray, TD 4,404 ft., pay 4,391 ft., flowed 344 bbl. 41°-gravity oil day, 18/64-in. choke, GOR 572 cu. ft., CP 290 psi., TP 230 psi.

**NORTH CENTRAL TEXAS (DISTRICTS 9 & 7-B) WILDCAT FAILURES**

Archer County: L. T. Burns 1 A. Fuller, C. C. Davis Sur. A-1160, 6 mi. NW Scotland, dry, TD 4,854 ft.

Brown County: McLean-Roberts 1-H Cox & McInnis, Sec. 26, Osborn Dalton Sur., 3 mi. W Owens, dry, TD 302 ft., elev. 1,363 ft.

Callahan County: Joe Josephson 1 Rosa McWhorter, Sec. 158, GH&M Sur., dry, TD 4,141 ft., elev. 1,758 ft., Caddo 3,406 ft., Ellenburger 4,099 ft.

Clay County: R. B. Farris 1 Tom Watson, TE&L Sur. No. 2611, 4½ mi. NW Shannon, dry, TD 1,235 ft.

Coleman County: L. J. Maxwell 1 Mrs. Mattie R. Miller, Sec. 728, D. Breeding Sur., 7 mi. N Coleman, dry, TD 2,100 ft., elev. 1,584 ft.

L. H. Moon 1 L. W. Bozeman, James H. Grimes Sur. No. 710., 5 mi. NW Coleman, dry, TD 2,910 ft., elev. 1,773 ft., Jennings 2,581 ft., Gardner 2,660 ft., Gray 2,838 ft.

United North & South Development Co. 1-B R. R. Browning, Sec. 14, H. N. Smith Sur., 3 mi. N Glen Cove, dry, TD 4,020 ft., Capps 3,366 ft., Fry 3,414 ft., Caddo 3,870 ft.

Comanche County: Parker Bros. 1 W. H. Weiser, Sec. 4, HT&B and J. H. Rogers Sur., 5 mi. SE Desdemona, dry, TD 3,006 ft., elev. 1,380 ft.

J. K. Wadley 1 G. E. Huddleston, Carlos Haynes Sur. No. 42, 3 mi. W Sidney, dry, TD 2,870 ft., elev. 1,556 ft., Barnett 2,704 ft., Ellenburger 2,815 ft.

Concho County: Seaboard Oil Co. 1 Ellen Sims, P. H. Brooks Sur. No. 2, 3 mi. NW Paint Rock, dry, TD 4,270 ft., elev. 1,736 ft., Ellenburger 4,064 ft.

Cooke County: D. H. Bolin 2 S. D. Meadors, H. Dickson Sur., 6 mi. NW Muenster, dry, TD 3,750 ft.

John F. Camp & Sons et al 1 H. G. Perry, Jacob Spear Sur., 3 mi. NW Gainesville, dry, TD 4,206 ft.

Fisher County: General Crude Oil Co. 1 Ida Dix, 102-1-H&TC, 7½ mi. NW Hamlin, dry, TD 5,209 ft., elev. 1,821 ft., Swastika 3,814 ft., Gunsite 3,773 ft., Canyon 4,353 ft.

Foard County: The Texas Co. 1 G. A. Schultz, 328-A-H&TC, 2 mi. SE Margaret, dry, TD 5,591 ft.

Haskell County: Phillips Petroleum Co. 1 Cole, Sec. 18, Wise CSL Sur., 12 mi. NW Haskell, dry, TD 6,233 ft., elev. 1,650 ft., Chappell 5,925 ft., Ellenburger 6,120 ft.

Jack County: Elm Oil Co. 1 Ira Williams, J. M. Ross Sur. A-992, 4 mi. SE Jermyn, dry, TD 4,821 ft., Bryson 3,123 ft.

F. Kirk Johnson 1 Henderson-Welch, E. M. Welch Sur. A-1338, 1½ mi. SE Joplin, dry, TD 5,520 ft., Caddo 4,298 ft.

W. T. Waggoner est., 1 Lewis-Hayes, G. Hallmark Sur., dry, TD 6,505 ft., Ellenburger 6,478 ft.

Jones County: Oxford Drilling Co. et al, 1 Mrs. Fannie Mae Harrell, 172-1-BBB&C, 5 mi. NE Hamlin, dry, TD 3,635 ft., elev. 1,750 ft., Swastika 3,580, King 3,397 ft.

Rock Hill Oil Co. 1 Hollis Madden, 1-359-Goliad CSL, 10 mi. N Anson, dry, TD 5,138 ft., elev. 1,840 ft., Swastika 5,074 ft.

Nolan County: C. L. Norsworthy, Jr., 2-A Nita Mae Brooks, 53-X-T&P, 6½ mi. NE Maryneal, dry, TD 6,100 ft., elev. 2,570 ft.

Palo Pinto County: Charlie Grace Drilling Co. 1 Joseph J. Mills, Sec. 888, TE&L Sur. A-464, 1½ mi. W Oran, dry, TD 2,290 ft., elev. 945 ft.

Shackelford County: G. E. Kadane & Sons 1 Walter Green est., Sec. 25, BAL Sur., 6 mi. NE Sedwick, dry, TD 3,036 ft., elev. 1,267 ft., Gunsite 2,485 ft., Reams 3,010 ft.

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T&P, 7 mi. W Albany, dry, TD 5,306 ft., elev. 1,850 ft., Barnett 4,950 ft., Chappel 5,066 ft., Ellenburger 5,125 ft.

Stephens County: The Texas Co. 2 A. M. Moon, Sec. 1307, TE&L Sur., 7½ mi. NE Breckenridge, dry, TD 4,700 ft., elev. 1,189 ft., Caddo 3,185 ft., Ellenburger 4,315 ft.

Stonewall County: Woodley Petroleum Co. and W. W. Walton 1 Minor Alexander, Sec. 10, W. Vardeman Sur. 347, 9 mi. SE Aspermont, dry, TD 3,617 ft., elev. 1,684 ft., Saddle Creek 2,915 ft., Swastika 3,510 ft.

Taylor County: Miami Operating Co., Inc., 1 John B. Girard, 36-1-SPRR, 3 mi. W Tuscola, dry, TD 4,657 ft., elev. 2,076 ft., Capps 4,190 ft., Gray 4,585 ft.

Woodley Petroleum Co. 1 W. T. Sherrell, W. E. Vaughn Sur. 107, 3 mi. NE Buffalo Gap, dry, TD 3,689 ft., elev. 1,935 ft., Palo Pinto 3,672 ft.

Wichita County: Consolidated Oil Co. 2 Sisk est., Blk. 23, Lge. 2, Denton CSL, 7 mi. SW Wichita Falls, dry, TD 633 ft.

Young County: Alan Drilling Co. 1 J. E. Hightower heirs, Sec. 190, TE&L Sur., dry, TD 4,526 ft.

T. V. Gorman 1 A. R. Nash, TE& L Sur. A-1017, 5 mi. S Jean, dry, TD 3,900 ft.

C. M. Knox 1 J. H. Alford est., S. Speed Sur. A-1291, 5 mi. SE Graham, dry, TD 2,608 ft., elev. 1,075 ft.

C. H. Peterson et al, 1 E. R. Prideaux, S. Tynes Sur., 3 mi. S Markley, dry, TD 510 ft.

## Texas Gulf Coast

### New Yegua Pay Found In Helen Gohlke Field

HOUSTON.—Yegua oil production is being established in Helen Gohlke field, De Witt County, at Shell Oil Co. 4 Helen Gohlke. Through perforations at 5,354-58 ft., the well flowed gas in 12 minutes and oil after developing 900 psi. working pressure at the surface. Perforations were also effected in the Wilcox at 8,132-44 ft. and the well flowed oil with no gage. Tubing pressure was 650 psi. and shut-in pressure 1,225 psi. Hole is bottomed at 8,202 ft. with 7-in. casing set on bottom.

Deep Rock Oil Corp. has gaged its new wildcat oil discovery, 1 A. J. Riesterer, De Witt County, for 220 bbl. of oil daily based on a 10-hour test. Operators are continuing to test on 12-shot perforations at 8,282-85 ft. in a sand section. The bottom 20 ft. of the sand is highly saturated with oil, and the balance is condensate. A previous drill-stem test was run at 8,246-62 ft., using ¼-in. chokes and 1,000-ft. water cushion; tool was open 21 minutes and recovery was mud and gas-condensate. Another test at 8,273-82 ft., using ¼-in. chokes, showed 73 psi. working pressure and recovery was 1,442 ft. of oil. This wildcat is in Thomas H. Bell Survey, 3 miles south of Arneckville, and 7 miles southeast of South Cottonwood Creek field.

New gas-condensate pay has been opened on the northeast flank of Chana field, Live Oak County, at Atlantic Refining Co. 1 Sanger heirs. On a 3-hour drill-stem test through perforations at 8,658-70 ft., the well flowed at the rate of 150 bbl. of 53°-gravity condensate daily through 12/64-in. choke. Tubing pressure was 3,500 psi. On a ½-hour test, the well flowed at the rate of 240 bbl. of condensate daily under tubing pressure of 3,000 psi. Production in the 7-year-old Chapa field has been from the 8,100-ft. and 9,100-ft. zones.

One mile northwest of Coletto Creek, Victoria County, G. W. McCarter failed to dually complete 1 Alex Angerstein, wildcat, in gas zones encountered at 2,200 ft. and 3,200 ft. Perforations were effected in both zones, but operator squeezed the lower, and finaled the well for 20,000,000 cu. ft. of gas daily from the upper zone. This well is 1,900 ft. south southwest of Fidelity Oil & Royalty Co. 1 Hulda Horadam, gas-condensate discovery which was dually completed at 4,372-76 ft. and 4,326-32 ft.

Tests are under way on a possible new Frio pay sand in Cox field, Wharton County, at Sohio Petroleum Co. 3 Jennie Beard. A drill-stem test was conducted at 5,646-69 ft. and the well flowed gas and salt water. These perforations will be squeezed and operator will reperforate. Hole is bottomed at 6,000 ft. with production string cemented at 5,850 ft. If production attempts fail in this deeper sand, operator will probably complete the well in the regular field pay around 5,500 ft.

**TEXAS GULF COAST (DISTRICTS 2 & 3) SUCCESSFUL WILDCATS**

Fort Bend County: The Texas Co. 1 H. B. McCrary et al, J. Knight and G. W. White League,, A-46, TD 7,830 ft., perf. 7,470-80 ft., 41 bbl. oil per day, 10/64-in. choke, gravity 40.1°.

Hardin County: New pay at Nelson—American Republics Corp. and Houston Oil Co. of Texas 1 Mary J. Cunningham et al, O. C. Nelson League, A-40, TD 7,093 ft., perf. 7,078-82 ft., 122 bbl. oil per day, 7/64-in. choke, gravity 40.9°.

Jefferson County: New pay at Fannett—Gulf Oil Corp. 21-A Junker-Spencer et al, Tr. "E," TD 9,883 ft., perf. 7,366-74 ft., 182 bbl. oil per day, 9/64-in. choke, gravity 33.6°.

Karnes County: Horrigan & Fohs 1 Mary Pargmann et al, Victor Blanco Survey, A-3, TD 7,400 ft., Luling 7,158-78 ft., 30,000,000 cu. ft. of gas daily plus 30 bbl. condensate per million cubic feet of gas, SIP 2,538 psi.

Newton County: New pay at Campton—Houston Oil Co. of Texas and American ReRpublict Corp. B-5 Earl C. Hankamer et al, "B," HT&BRR Sur. A-933, TD 7,227 ft., perf. 7,219-21 ft., 42 bbl. oil per day, 7/64-in. choke, gravity 38.3°.

**TEXAS GULF COAST (DISTRICTS 2 & 3) WILDCAT FAILURES**

Fort Bend County: Sparta Oil Co. 1 Ben


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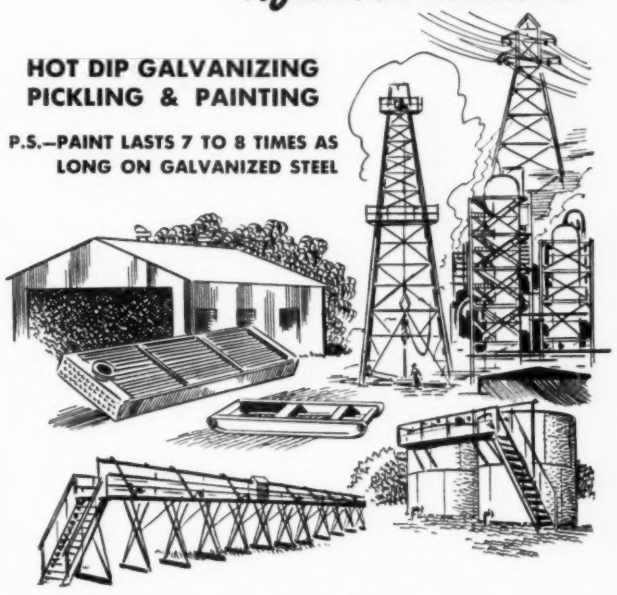

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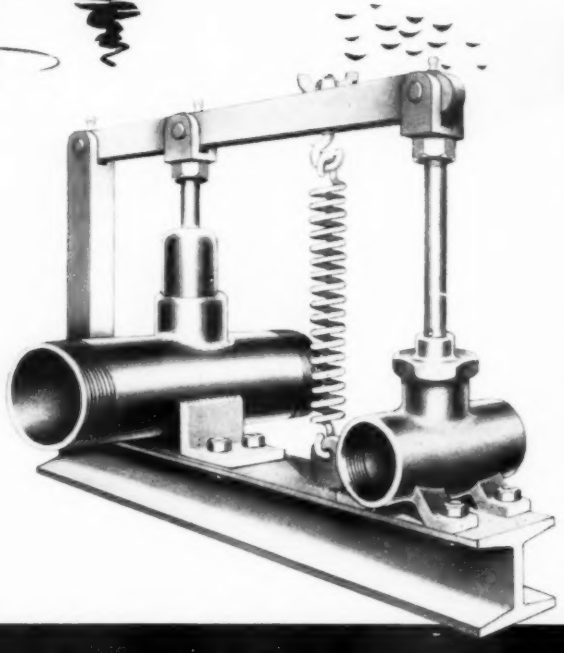

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Zorevec, H&TC Sur. 30, Lot 7, dry, TD 6,859 ft.

Grimes County: J. M. West 2 Mrs. Belve Harrison, A. B. Dodson Sur. A-174, dry, TD 1,355 ft.

Harris County: O. N. Beer et al. 1 Mrs. M. E. Riley, A. Whitlock Sur. A-799, dry, TD 8,011 ft.

Wharton County: C. H. Osmond 1 Blanche Vitera, Willia mWhite Sur. A-644, dry, TD 5,586 ft.

# Permian Basin

## Rank Wildcat in Dawson Is Good Flowing Producer

MIDLAND.—El Tee 1 F. Briley, 96-M-EL, Pennsylvanian reef discovery 11 miles northwest of Lamesa in Dawson County, has been completed flowing 735 bbl. of 40°-gravity oil daily. Production was through a 50/64-in. choke from perforations at 8,575-90 ft. Gas-oil ratio was 705 cu. ft. and flowing tubing pressure 120 psi. Two miles north and east of the discovery, Texas Crude Co. will drill 1 Constance E. Knight in the C SW SW of Section 75.

Sunray Oil Corp. 1 Harris is dry at 8,170 ft., plugged back depth, after extensive tests of the Spraberry. It also was a failure in the Pennsylvanian at 10,718 ft.

In Midland County, The Texas Co. 3-D Scharbauer, 1 mile northwest of the Hi-Lonesome Wolfcamp area, flowed oil on a drill-stem test of the Pennsylvanian from 10,665-10,720 ft. Open 7½ hours, gas came to the surface in 5 minutes and oil in 2 hours. The well made 35.76 bbl. of 44°-gravity oil in 4¾ hours. Casing was being run for completion.

Sinclair Oil & Gas Co. 3-C June Tippett, Ellenburger producer 2 miles north of Pegasus pool, has been completed for 786 bbl. of 51°-gravity oil daily. Production was through ½-in. choke and perforations from 12,960-13,090 ft.

Greenbrier Oil Co. and others 1 McAlester, 2 miles southeast of Germania, was preparing to test at 8,365 ft. A 4-hour drill-stem test of the lower Spraberry from 8,200-37 ft. recovered 100 ft. of gas-cut mud.

A Clear Fork discovery in southwestern Gaines County is Union Oil Co. 2 T. C. Weltner. The well was completed through perforations from 7,128-31 ft. for 99 bbl. of 47°-gravity oil daily through a 31/64-in. choke. It is 7 miles south of East Hobbs multipay pool of Gaines and 2 miles east of the House area of eastern Lea County, New Mexico.

Greenbrier 1 Windham, Upton County Wolfcamp prospect 3 miles southeast of the Wilshire area, topped the Wolfcamp at 8,470 ft., 180 ft. low to the discovery well, and pay at 9,040. It is drilling ahead below 9,390 ft. Pure Oil Co. will drill a south offset to the indicated strike. The new venture is 1 R. S. Windham, 660 ft. from the north and west lines of Section 107, Block D, CCSD&RGNG Survey.

Rowan Oil Co. and Roger B. Owings 2 Ben Schwertner has developed flowing production from a Permian lime zone above the Spraberry. On a 7-hour drill-stem test from 6,395-6,420 ft. there was gas in 10 minutes and oil in 3¾ hours. The flow was estimated at 7½ bbl. an hour. This well is a north offset to the 1 Schwertner, a Spraberry well which also showed oil from the upper zone.

A third pay, the Strawn, has been opened in the Cogdell area of southern Kent County with completion of Chapman & McFarlin 49 D. M. Cogdell. The discovery gaged 265 bbl. of 34°-gravity oil daily on test through perforations from 7,323-30 ft.

On a drill-stem test of the Ellenburger from 7,780-83 ft., Moore Exploration Co. 1 Noelke estate, had a show of gas and recovery of 40°-gravity oil. With the tool open 30 minutes, gas was at the surface in 6 minutes with a good blow throughout the test. Recovery was 1,260 ft. of o.i. There was no water. The wildcat is 10 miles southwest of Mertzon in Irion County. If the well is completed as an Ellenburger producer, it will be the first well from that formation in the county.

### WEST TEXAS (DISTRICTS 8 & 7-C) SUCCESSFUL WILDCATS

Andrews County: Magnolia Petroleum Co. 1 Tom Peay, 6-314 Gaines CSL, TD 14,085 ft., elev. 3,160 ft., Wolfcamp pay 9,227 ft., flowed 375 bbl. 39°-gravity oil a day through ½-in. choke, 2-in. 9,302 ft., GOR 589 cu. ft., TP 275 psi.

Crane County: Humble Oil & Refining Co. 3 Jax M. Cowden et al, 47-X-CCSD&RGNG, TD 8,984 ft., Silurian 7,256 ft., Fusselman 7,385 ft., pay 7,346 ft., flowed 65 bbl., 42°-gravity oil a day, 2-in. 7,416 ft., GOR 246 cu. ft.

Runnels County: Burke Royalty Co. 1 Tubbs, Blk. 7, Y. Fowler Sur., 7 mi. SW Withers, TD 4,485 ft., pumped 20 bbl. 39°-gravity oil a day, GOR 300 cu. ft.

### WEST TEXAS (DISTRICTS 8 & 7-C) WILDCAT FAILURES

Andrews County: Sun Oil Co. 1-A Nellie C. Martin, 8-A30-PSL, dry, TD 8,394 ft., elev. 3,471 ft., Tubb 6,580 ft.

Crockett County: Malco Refineries, Inc., et al, 4 Archie Bean, 13-UV-GC&SF, 15 mi. NW Ozona, dry, TD 1,401 ft.

C. B. Simmons et al, 1 Mary E. Powell, 29-GH-GC&SF, 11 mi. N EOzona, dry, TD 1,344 ft., elev. 2,452 ft., San Andres 980 ft.

Crosby County: Kewanee Oil Co. 1 Cannon, 85-2-H&GN, SE corner of county, dry, TD 7,130 ft., elev. 2,302 ft., Wolfcamp 4,620 ft., Canyon 7,016 ft., Mississippian 7,661 ft.

Dawson County: George R. Brown 1 A. F. Krezer, 34-T-4-N-T&P, 3 mi. E Sparenburg, dry, TD 9,653 ft., elev. 2,875 ft., Spraberry 7,055 ft., Strawn 9,604 ft.

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lan est., 91-M-EL&RR, 6 mi. SW Welch, dry, TD 5,069 ft.

Howard County: T. W. Doswell and Todd M. Pettigrew 1 Willis Winters, 6-25-H&TC, dry, TD 7,786 ft., elev. 2,338 ft., Spraberry 5,044 ft., reef 7,529 ft.

Spartan Drilling Co. et al. 2 Phillips, 19-33-T-2-N-T&P, dry, TD 6,840 ft., elev. 2,589 ft., Clearfork 4,640 ft., Spraberry 6,465 ft.

Kent County: The Texas Co. 1 S. M. Swenson, 19-2-G&GN, dry, TD 7,573 ft., elev., 2,218 ft.

Pecos County: Patrick A. Doheny 1 Leon Frame, 1-203-J. H. Handy, 4 mi. W Fort Stockton, dry, TD 3,152 ft., Yates 2,770 ft.

Runnels County: Garrett Producing Co. 1 D. D. McDaniel, A. Losoya Sur. No. 515, 8 mi. NW Talpa, dry, TD 3,830 ft., elev. 1,870 ft., Jennings 3,700 ft., Gardner 3,770 ft.

Scurry County: Lion Oil Co. 1 Helms, 631-97-H&TC, NE corner of county, dry, TD 7,274 ft., elev. 2,112 ft., Canyon 6,638 ft., Strawn 6,839 ft., Ellenburger 7,194 ft.

Tom Green County: G. L. Howse 1 Mrs. Martha E. Davis et al, Sec. 135, Dist. 11, 3½ mi. SE Wall, dry, TD 4,769 ft., elev. 1,944 ft.

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### SOUTHEASTERN NEW MEXICO

HOBBS—Buffalo Oil Co. 12-B M. E. Baish-Federal, 22-17s-32e, deep test in the Maljamar area of western Lea County, reported a good show of oil on a drill-stem test of the Pennsylvanian from 10,715-10,836 ft. The pool, which extends into eastern Eddy County, produces from Queen's sand, Grayburg, San Andres, and Glorietta. On the 4-hour test, gas was at the surface in 18 minutes. Recovery was 4,070 ft. of 37.9°-gravity oil and 1,530 ft. of oil-cut mud. It was drilling ahead in the Pennsylvanian, topped at 10,050 ft.

Magnolia Petroleum Co. 1-B Santa Fe, 26-9s-36e, Crossroads field well but 1½ miles west of nearest production, will be completed in the Devonian from open hole at 12,130-37 ft. The well flowed 152 bbl. of 44.4°-gravity oil in 2 hours on a drill-stem test of the open hole interval.

Magnolia 1 J. D. Black, 9-15s-36e, 8 miles west of Denton pool, recovered 1,750-ft. water blanket cut with oil and gas, 10 ft. of free oil, and 110 ft. of oil and gas-cut mud on a 3-hour drill-stem test. The test was in the Permo-Pennsylvanian from 10,526-41 ft. Operator was coring from 10,543 ft. in lime.

### SOUTHEAST NEW MEXICO SUCCESSFUL WILDCAT

Lea County: The Texas Co. 1-AR State, Sec. 2-11-37, 8 mi. N Gladiola field, TD 11,580 ft., elev. 3,957 ft., Devonian 11,420 ft., pay 11,500 ft., flowed 319 bbl. 40°-gravity oil a day, 24/64-in. choke, GOR 25 cu. ft., TP 25 psi.

### SOUTHEAST NEW MEXICO WILDCAT FAILURE

Eddy County: E. N. Brock 1 Jennings, Sec. 10-25-26, dry, TD 2,141 ft., elev. 3,379 ft., Delaware 2,010 ft.

# Eastern Texas

## Mid-Continent Brings In Deep Pennsylvanian Well

DALLAS.—Mid-Continent Petroleum Corp. 1 Martin, Walker Survey, Pennsylvanian discovery 4 miles southeast of Sandusky, Grayson County, has been completed for 252 bbl. of 34°-gravity oil daily through 16/64-in. choke and open hole from 6,912-93 ft.

The Texas Co. 1 Neal, Stickney Survey, 1½ miles south of nearest Ellenburger production in the Sandusky area, recovered 360 ft. of free oil and 120 ft. of salt water on a 1-hour drill-stem test from 6,450-70 ft. Drilling continued below 6,528 ft.

Mid-States Oil Corp. 1 Bender, Holman Survey, northeast outpost to the Woodlawn Pettit gas-distillate area of Harrison County, cored from 6,361-90 ft. in the Pettit. Recovery was 29 ft. of dense to slightly crystalline lime, having a light brown distillate stain and a gas odor in the more porous sections. Operator was coring deeper in the Pettit.

L. W. Dennis and Eugene J. Hunter 1 C. L. Newburn, J. F. Anthony Survey, 1-mile northeast extension to North Jacksonville Woodbine pool of Cherokee County, has been completed for 8,800,000 cu. ft. of gas daily, plus 60 bbl. of 56.8°-gravity distillate per million cubic feet of gas.

B. G. Byars and E. L. Kurth will drill a 7,500-ft. wildcat 6 miles southeast of Lufkin in Angelina County. It will be 1 Angelina County Lumber Co., 2,750 ft. from the east and 2,250 ft. from the south lines of a 2,865-acre lease in the Thomas Caro Survey. This is the first deep hole for the county in some time.

### EAST TEXAS (DISTRICTS 5 & 6) WILDCAT FAILURES

McLennan County: L. C. Harrison Oil Co. 1 Carrie Pearson, J. D. Sanchez Sur., 1½ mi. N Riesel, dry, TD 1,633 ft., elev. 514 ft.

Ranford & Medearies 1 L. R. Harding, W. W. Hill Sur., 4 mi. NE Bruceville, dry, TD 521 ft., elev. 575 ft.

Red River County: Goss Drilling Co. 1 R. A. Graves, W. Bailey Sur., ½ mi. W Woodland, dry, TD 1,925 ft., elev. 474 ft., Glen Rose 1,832 ft., Rodessa 1,912 ft.

Rusk County: Sanders-Fye Drilling Co. 1 Clem S. Clarke, N. Howeth Sur., 2 mi. SW Pinehill, dry, TD 2,975 ft.

Shelby County: American Republics Corp. 2 Pickering Lumber Co., J. L. Arnwine Sur., dry, TD 6,263 ft., elev. 260 ft., James 5,654 ft., Pine Island 5,860 ft., Pettit 6,215 ft.

Wood County: Hollandsworth Oil Co. 1


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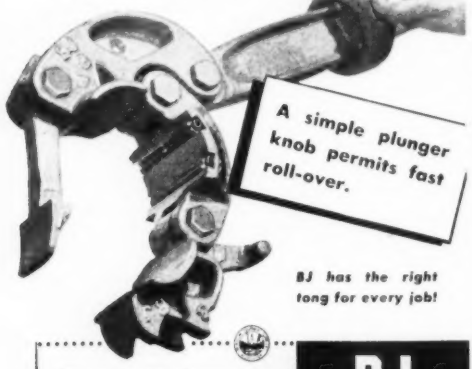


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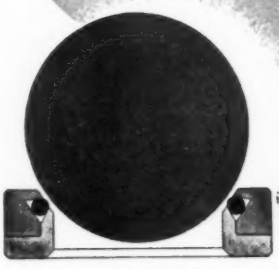

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# Oklahoma

## Offset Starts for New Pond Creek Discovery

CUMMINGS-McINTYRE and associates are starting the first confirmation test for their newly discovered Wilcox sand pool east of Pond Creek, Grant County. The new test, 1 Sherman, NW SW NW 5-25n-5w, is a northeast offset to the discovery well, 1 Combs, SE SE NE 6-25n-5w. The pool, located in the south central part of the county, is one of several Wilcox producing areas discovered in the last several years in Grant County, in the upper part of the Harper embayment of the Anadarko basin. It is 6 miles west of the Southwest Rich Valley pool, opened in June.

Discovery well of the new Pond Creek pool flowed 374 bbl. of oil through ⅛-in. choke during a 10-hour production test before being shut in. Bottom of the hole at 5,982 ft. is in the second Wilcox sand, and is open from 5,952 ft. in the Marshall zone.

Coal Oil & Gas Co. has indicated confirmation of Oil Creek sand production opened earlier this year in the East Oconee field, Coal County. The prospective confirmation well is 2 Pope, C NE NW 34-1n-9e, southwest diagonal offset to the discovery well, 1 Styron, C SW SE 27. It is reported to have made a substantial oil flow, estimated at more than 100 bbl. per hour, in a drill-stem test at 7,438-48 ft. Previous drill-stem tests higher in the pay, topped at 7,398 ft. (unofficial), indicated gas-distillate production. Operators have run casing to complete the well.

Superior Oil Co. has moved its rig from its new gas-distillate discovery well, 73-18 Allred, NW SE NE 18-8n-20e, 3 miles north of Kinta, Haskell County, to another rank wildcat location in the SW NE SW 12-7n-14e, 10 miles north of McAlester, Pittsburg County. The new location is for 36-12 Lytle, a projected 7,500-ft. test. The Kinta discovery well, now standing shut in, is reported unofficially to have flowed at rates up to 30,000,000 cu. ft. per day. Total depth is 7,483 ft.

Development of Springer sand production in the southwest portion of the Sholem Alechem field, in Stephens County, has resulted in another good well where Stanolind Oil & Gas Co. completed its 2 Inscore-McCollum, C SE NE SW 24-1s-4w. The well pumped and flowed 760 bbl. of 31°-gravity oil in 24 hours with casing perforated at 5,138-46 ft. and 5,150-64 ft. Top of the pay is 5,136 ft.

Confirmation of the recently opened Northeast Mammoth pool in Lincoln County is indicated at The Texas Co.'s second test, 1 Charles, SW NW N W34-13n-3e, north offset to the discovery well, 1 Roberts, where production tests are under way. Senora sand, pay zone of the discovery well, is being tested in the new well through casing perforations opposite an interval at 4,548-85 ft. A drill-stem test of the interval got a good showing of gas and a recovery of 120 ft. of 37°-gravity oil and 120 ft. of heavily oil-cut mud. Bottom of the casing is at 4,615 ft. in hole drilled to 4,728 ft.

Production at the extreme northeast end of the elongated, winding South Ceres pool, Noble County, has been extended a quarter mile east where Arthur B. Ramsey has completed his 1 Collier, SW NE NE 32-24n-1e. With hole open in Bartlesville sand at 4,256-81 ft., the well flowed initially at the rate of 25 bbl. of oil per hour.

### OKLAHOMA SUCCESSFUL WILDCATS

Garfield County: Sterling Oil of Oklahoma, Inc., 1 L. Brunken, SW SE NE 29-23n-4w, flowed 18 bbl. 70°-gravity condensate from Mississippi lime at 5,514-56 ft., TD 6,132 ft., extension of SE Spring Valley.

Lincoln County: Mid-Continent 1 Mable Rueb, SW SW NE 23-15n-5e, flowed 1,190,000 cu. ft. gas from Prue at 3,325-42 ft., TD 4,294 ft.

Logan County: R. M. Jordan 1 Yates, E 2 SW SW 29-16n-1w, pumped 35 bbl. oil from Red Fork at 5,314-36 ft., TD 5,869 ft., extension to Union Valley.

Davon Oil Corp. et al, 1 Derr, NW NE NE 15-17n-3w, flowed 188 bbl. 42.4°-gravity oil from Layton at 4,646-74 ft., TD 4,700 ft.

Pawnee County: Dirickson-Lewis Drilling Co. 1 School Land, SE SW NE 16-21n-6e, pumped 23 bbl. 36°-gravity oil from Prue at 2,603-12 ft., TD 2,663 ft., old dry hole drilled deeper, extension to Casey.

Washita County: Gulf Oil Corp. 1 A. B. Walker, C NE SW 9-8n-20w, flowed 128 bbl. 32.9°-gravity oil from granite wash at 5,532-5,645 ft., TD; extension to West Sentinel.

### OKLAHOMA WILDCAT FAILURES

Bryan County: Sohio 1 E. L. Dillard, NW NW SE 17-7s-8e, dry, TD 2,764 ft., strat test.

Cotton County: S. F. Hutcheson 1 C. L. Merriott, NW NE SW 30-1s-11w, dry, TD 2,500 ft.

Jack Grace Producing Co. 1 G. A. Palmer, NW NW SW 21-2s-9w, dry, TD 2,388 ft.

R. B. Ross et al 1 Kirkpatrick, NW NW NW 25-4s-12w, dry, TD 2,140 ft.

Garfield County: Falcon Seaboard Drilling Co. 1 Clark, SW SW NE 22-24n-5w, dry, TD 6,501 ft.

Grady County: Cities Service et al 1 Amberg, C NE SW 5-8n-5w, dry, TD 12,050 ft.

Greer County: W. B. Patterson 2 Irion, NE SW SW 29-6n-22w, dry, TD 1,003 ft.


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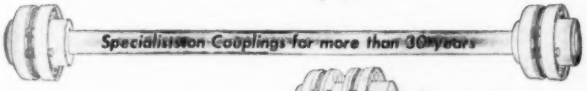


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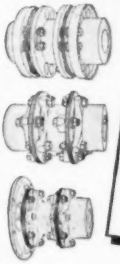

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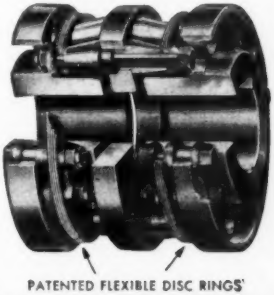

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Jefferson County: Sinclair 1 G. A. Faulkner, SE NW NE 11-4s-4w, dry, TD 4,366 ft.
Sun Drilling Co. 1 Barrett, NW NW SW 11-6s-6w, dry, TD 2,845 ft.
Lincoln County: Blackwell Oil & Gas 1 P. E. Simon, NW NE NW 3-13n-5e, dry, TD 4,920 ft.
Logan County: Ashland Oil & Refining 1 Gaffney, SW SW SW 27-16n-2w, dry, TD 6,068 ft.
Noble County: H. P. Chansey 1 Vacklay Pour, NE NE NE 32-21n-3e, dry, TD 4,190 ft.
Okfuskee County: M. P. Evans and W. B. Joyes 1 F. W. Hessman, NW NW SE 28-12n-7e, dry, TD 4,000 ft.
Pawnee County: Wilcox Oil 1 H. Davis, SW SW NE 30-20n-5e, dry, TD 3,882 ft.
Stephens County: W. B. Atkinson 2 Simpson Hurst, NE NE SW 20-2s-6w, dry, TD 2,965 ft.
F. K. Johnson and Deane Gill 1 Nora Diehl, SW SE NE 1-2s-7w, dry, TD 4,584 ft.
Deep Rock Oil Corp. 1 Massie, NW NW NW 31-1s-5w, dry, TD 10,510 ft.
Tillman County: Carter Oil Co. 1 Anna Kurz, SE SW SW 25-1s-17w, dry, TD 6,360 ft.

## South Louisiana

### Vermilion Parish Test Chalked Up as Failure

NEW ORLEANS.—Bates & Cornell drilled 1 Frank A. Godchaux and Sons, wildcat, 83-14s-3e, Vermilion Parish, to a total depth of 11,500 ft. in lime and shale. Electric survey was run to bottom indicating no shows. This failure, located in the northwest Vermilion Bay area of the parish, was originally projected to 9,500 ft.

In the same parish, Union Oil Co. of California is drilling below 10,756 ft. at 1 Mary McIlhenny, 2-17s-2e, wildcat in the South Freshwater Bayou area. Projected depth is 12,000 ft.

Texas Pacific Coal & Oil Co. and associates are building roads to location for an 8,500-ft. Wilcox wildcat in Avoyelles Parish. The venture, 1 C. H. Fisher, C NW NE 33-3n-5e, is approximately 6 miles northeast of Marksville in the Twisty Bayou area of the parish.

Meanwhile, it is reported that two other wildcats will shortly be announced for Avoyelles Parish. Hunt Oil Co. and associates are reportedly planning a Wilcox test in Township 2n-3e, east of Marksville. Crown Central Petroleum Co. is expected to announce location soon for another Wilcox test in 14-1n-5e, in the Hamburg section.

Shell Oil Co. has staked location for a 15,000-ft. wildcat in the Vermilion Bay area of Iberia Parish. The venture is 1 State Lease 1814, Section 18-17s-6e.

In Acadia Parish, American Republics Corp. 1 A. G. Kerr, 1-9s-1w, is testing through perforations at 10,128-35 ft. This wildcat is located ¾ mile north of Ellis field. A previous test at 10,837-41 ft. failed to flow.

Magnolia Petroleum Co. 1 Ragley Lumber Co. "D," 29-5s-7w, Allen Parish wildcat located 1 mile east and south of Hurricane Creek field, is drilling below 13,435 ft. in shale. The well has a projected depth of 16,000 ft.

**SOUTH LOUISIANA WILDCAT FAILURES**

Acadia Parish: Sun Oil Co. 1 H. L. Miers et al, 39-10s-2w, dry, TD 11,540 ft.
East Baton Rouge Parish: Progress Petroleum Co. 1 Browning unit, 99-6s-1e, dry, TD 8,734 ft.

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## Southwest Texas

### Bexar County Wildcat Has Shallow Shows

CORPUS CHRISTI.—Noah Davis is preparing to attempt completion after drilling deeper and running casing on his 1 Clark-Kempshall, Bexar County wildcat located 2 miles east of Thelma. This wildcat had oil shows in the Wilcox topped at 690 ft.; the Porth topped at 825 ft.; a 30-ft. show in the Anacacho topped at 2,236 ft.; a 100-ft. oil sand in the Navarro; and a show in the Austin chalk called at 2,380 ft. Based on electric log, it is believed that completion will be made in the Austin.

Three-fourths mile south of Big Foot field, Frio County, Forney & Winn have found a highly saturated sand section in 1 Alma Marburger, indicating a possible new discovery for the area. Operators are now fishing for packer that hung while attempting a drill-stem test at 3,495-3,536 ft. No recovery was made, but a good surface blow has been reported. The hole is bottomed at 3,536 ft.

A new pay is indicated at St. Charles field, Aransas County, at Western Natural Gas Co. 16 St. Charles ranch. On a drill-stem test at 8,288-98 ft., the well flowed oil at the rate of 520 bbl. per day through ¼-in. choke. The hole is bottomed at 8,991 ft., with 9⅝-in. casing set on bottom. This is the second new zone discovery for the field this year. The same firm's 13 St. Charles ranch was completed as a gas well in the 10,320-ft. sand.

Larremore field production has been extended approximately ¾ mile to the southeast at Southern Production Co. 1 Emil Willms. Completion was made on 24 shot perforations in the Edwards lime at 1,327-31 ft. The well yielded 18 bbl. of 30°-gravity oil daily. Location is in C. Crenshaw Survey, Abstract 68, Caldwell County.

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**SOUTHWEST TEXAS (DISTRICTS 1 & 4) WILDCAT FAILURES**

Guadalupe County: F. D. Glass Jr., et al, 1-A Frank Zoboroski, James D. Clements Sur., A-11, dry, TD 2,725 ft.

Jim Hogg County: Lewis O. Kelsey Corp. 1 H. P. Guerra, Las Cuevitas Gt., dry, TD 3,110 ft.

Jim Well County: A. W. Gregg 1 L. A. Straube, Blk. 8, Carl Francis Farm Lots Sub., Garza I & M Co. Sur., A-175, dry, TD 5,015 ft.

Milam County: Roland B. Paxson 2 M. M. Camp et al, J. J. Acosta Sur., 3 mi. SW Tracy, dry, TD 1,537 ft.

San Patricio County: Calvert, Cochran & Manley 1 A. B. Coffin, Ed McGloin Sur., A-15, dry, TD 4,685 ft.

Webb County: J. N. Abel et al, 1 Jose de la Garza, CCSD&RGNG RR Sur. 47, dry, TD 2,707 ft.

Harry E. Murray et al, 1 Mabel Adami, Sur. 337, 20 mi. NW Freer, dry, TD 2,510 ft.

Zapata County: Gorman & DeLange 1 Fernando Cuellar, SK&K Sur. 59, Cert. 107, dry, TD 2,507 ft.

## Kansas

### Second Pay Zone Opened In New Purdyville Pool

PRODUCTIVE potentialities of the new Purdyville pool in the south central part of Hodgeman County, have been greatly enhanced by the opening of the second pay zone, the Pennsylvanian conglomerate, by M. B. Armer and Harry Koplin at their 4 Schrader, SE NW NW 3-24-24. The three other wells completed in this pool, opened last April, produce from the immediately underlying Mississippian.

The new well produced 195 bbl. of oil in a 3-hour swabbing test from casing perforations opposite an interval at 4,651-60 ft. and is being put on the pump for completion. Pay zone was topped at 4,645 ft. (—2,164 ft.). Casing had been run through this zone, as well as the Mississippian and other lower horizons, to 5,226 ft. in pre-Cambrian granite wash, topped at 5,225 ft. Total depth is 5,233 ft. in the latter formation. Both the Mississippian and the granite wash also carried oil shows. The well is the first for the pool to be carried below the Mississippian. It logged Viola at 4,942 ft. and the Simpson at 5,174 ft. Arbuckle was missing.

Location of the well is a location diagonally northwest of the original discovery well, I. W. Siegel 1 Schraeder, NW SE NW 3, which was completed with a flowing potential rating of 1,549 bbl. per day from its Mississippian pay zone at 4,663-83 ft. The other two Mississippian wells, also good producers, are at successive locations east of the discovery well.

Additional wildcatting is getting under way in Decatur County, located on the northern tier of counties west of the Central Kansas uplift, following the recent completion by The Texas Co. of its 1 Keenan, NW NW SE 24-5-27, first producer for the county. Interests of the late Harry Gore are starting two new wildcats, one being 1 Norris, NW NW NW 12-4-26, 8 miles northeast of The Texas Co.'s well, and the other 1 Brooks, NE NE NE 9-4-25, 11 miles northeast. Sam Pack already had location for 1 Green, NW NW NW 8-5-27, about 5 miles northeast. Ashland Oil & Refining Co. has an active operation in the NW NE 31-27n-7w, 5 miles south of Sand Creek, where it is drilling below 5,240 ft. in its 1 Albright.

In the meantime, The Texas Co. is starting a west offset to its discovery well. It is 1 Jennings, NE NE SW 25-4-27. The discovery well, producing from casing perforations at 3,478-82 ft. in the Lansing lime section, pumped 162 bbl. of net oil with 100 bbl. of water per day on potential tests.

Anschutz Drilling Co. has prospects of a good producer in its 1 Modscheidler, NE NE

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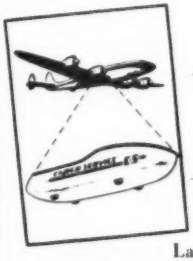

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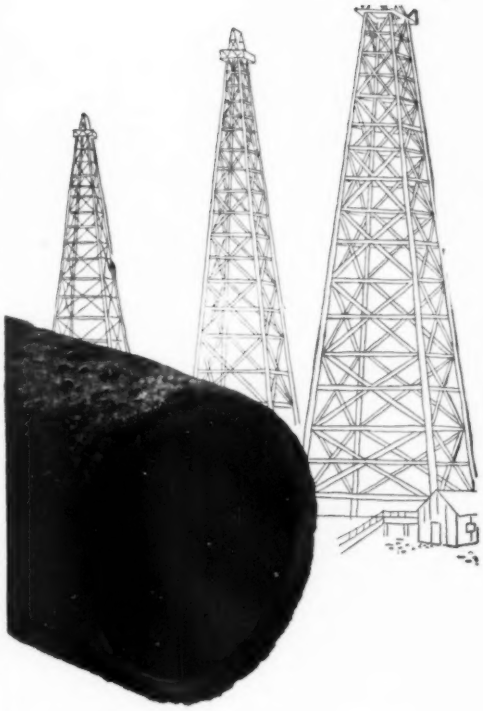

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SE 21-24-11, ½ mile west of production in the Zenith-Peace Creek pool, where promising oil showings were encountered in both the Pennsylvanian conglomerate, topped at 3,727 ft. (—1,903 ft.), and Viola lime, topped at 3,828 ft. (—2,004 ft.). A drill-stem test at 3,722-33 ft., taking in the top of the conglomerate zone, had gas at the surface within 4 minutes and flowed oil in 9 minutes. Flow rate was estimated at 10 to 20 bbl. per hour. Viola was drilled to 3,828 ft. and casing run to 3,829 ft., 1 ft. in the top.

### KANSAS SUCCESSFUL WILDCATS

Barber County: Skelly 1 Harbaugh "C," SE SW SE 13-33s-12w, 7,000,000 cu. ft. gas from Douglas sand at 3,659-68 ft., TD 5,058 ft.

Barton County: Alpine 1 McIlrath, NE NE NW 19-19s-12w, flowed 346 bbl. oil from Lansing at 3,208-14 ft., TD 3,430 ft.

Butler County: Hartman 1 Cox, W SE SE 32-27s-3e, pumped 10 bbl. oil from Simpson at 3,039-52 ft., TD 3,115 ft.

Graham County: Gore 1 Law, NW NW SW 2-10s-23w, pumped 77 bbl. oil from Marmaton at 4,126-42 ft., TD 4,268 ft.

Stafford County: Northern Ordnance et al, 2 Voigt, NE NE SW 12-22s-12w, pumped 149 bbl. oil from 3,615-17 ft., TD 3,665 ft., new zone in Max.

Trego County: Stanolind 1-A Anderson, NE NE SE 28-12s-22w, 67 bbl. oil from 4,037-81 ft., TD 4,085 ft.

### KANSAS WILDCAT FAILURES

Ellis County: Skelly 1 Befort, NE NE NW 12-14s-19w, dry, TD 3,868 ft.

Hodgeman County: Lauck 1 Sinclair, NW NE SE 30-21s-25w, dry, TD 4,520 ft.

Lane County: Herndon 1 Eitel, NW NW NE 18-18s-30w, dry, TD 4,720 ft.

Marion County: Aladdin 1 Hawk, SE SE NE 31-22s-4e, dry, TD 2,864 ft.

Ingling et al, 1 Klassen, SW NW SW 18-21s-1e, dry, TD 3,524 ft.

Norton County: Herndon 1 Mindrup, SW SW NW 13-5s-25w, dry, TD 4,003 ft.

Phillips County: The Texas Co. 1 Baynes, SW SW NW 8-2s-19w, dry, TD 3,930 ft.

Rice County: Skiles 1 Skiles, NE NE SW 8-18s-8w, dry, TD 3,457 ft.

Rush County: Iron 1 Austermiller, SE NE NE 29-19s-16w, dry, TD 3,876 ft.

Russell County: The Texas Co. 1 Morgenstern, NW NW SE 23-15s-15w, dry, TD 3,441 ft.

Stafford County: McBride 1 Richardson, SW SW NW 26-22s-11w, dry, TD 3,710 ft.

Sumner County: Champlin 1 Lauterbach, NW NE SE 21-32s-2w, dry, TD 4,470 ft.

## Mississippi

### Testing Results Released On Pike County Wildcat

JACKSON.—Humble Oil & Refining Co. has released some details on testing operations at its Pike County wildcat, 1 Bill Fortenberry, 27-2n-9e. On a 3-hour drill-stem test at 11,169-75 ft., recovery was 810 ft. of mud cut with salt water, 180 ft. of muddy salt water, and 9,495 ft. of salt water. These perforations were squeezed and casing was then perforated at 10,742-10,800 ft. Recovery from a 29-hour drill-stem test, using ¼-in. chokes, was 180 ft. of oil, 2,050 ft. of oil and gas-cut mud, and 4,310 ft. of water. These perforations were squeezed and operator reperforated at 10,742-75 ft. It is reported that the well will be given a Hydrafrac treatment before testing is continued.

The first Wilcox production has been established in Carthage Point field, Adams County, at Vaughey & Vaughey 2 Board of Supervisors, 3-6n-4w. This well was originally completed from the lower Tuscaloosa as a gas-condensate well, but had gone to salt water. When attempts to squeeze off the water failed, operators plugged back to the Wilcox and perforated at 5,972-74 ft. The well flowed 17 bbl. of 39.6°-gravity oil in 4 hours through ⅛-in. choke with top pressure of 615 psi. On a 16-hour test through 11/64-in. choke, it flowed 145 bbl. of oil with 510 psi. top pressure. Operators are currently preparing to complete the well.

Sun Oil Co. has staked location for a second wildcat test on its extensive Hancock County block. The test is 1 Whitfield-Weston unit, C NE NW 22-7s-16w, which has a proposed depth of 10,000 ft. It is approximately 7 miles north of the same operator's 1 Weston Lumber Co., 28-8s-16w, which is now bottomed at 10,378 ft. This latter well is being drilled "tight."

Stanolind Oil & Gas Co. has had little success in trying to complete 1 F. A. Steward, 11-1n-8e, Escambia County, Alabama. The latest test attempt was at 5,937-41 ft. and the well would not flow. Swab was then run with recovery being water cushion and 1 bbl. of mud in 5 hours. On next run, recovery was 4-5 bbl. of oil and no water. Three more runs with the swab yielded 18 bbl. of salt water cut with approximately 5 per cent oil. At last report the well had been swabbed two more hours with recovery being 23 bbl. of salt water and only 1 bbl. of oil.

### MISSISSIPPI SUCCESSFUL WILDCAT

Franklin County: Dave Gammil-L. Cashion Co. 1 D. F. Anderson, 3-5n-1e, TD 7,010 ft., Baker 6,265½-66½ ft., 92 bbl. oil per day, gravity 38.5°.

### MISSISSIPPI WILDCAT FAILURES

Adams County: John S. Callon 1 Katie C. Montgomery est., 78-7n-1w, dry, TD 6,602 ft.


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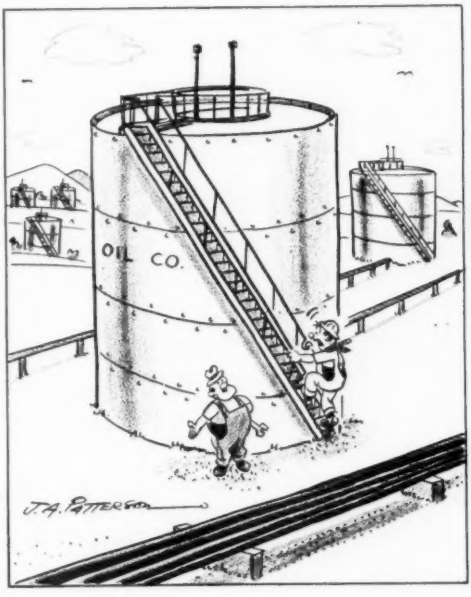


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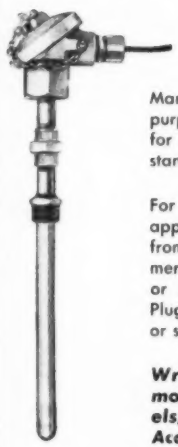

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Humble Oil & Refining Co. 1 David Junkin Tr. et al, 12-8n-3w, dry, TD 6,503 ft.
Hancock County: Sun Oil Co. 1 Weston Lumber Co. 28-8s-16w, dry, TD 10,370 ft.
Jefferson County: G. A. Clements-G. G. Stanford 2 Jake Wagner, 18-8n-2e, dry, TD 6,510 ft.
Wilkinson County: Gulf Refining Co. 1 Crosby Lumber & Manufacturing Co. et al, 28-4n-2w, dry, TD 7,193 ft.
Yazoo County: Los Nietos Co. 1 Yazoo County, 11-12n-2w, dry, TD 7,005 ft.

**ALABAMA WILDCAT FAILURE**

Franklin County: D. E. Loveridge-Owen Heath 1 Reggie Johnson, 17-8s-13w, dry, TD 2,007 ft.

## California

### New Reserves Being Tapped By Record Wildcat Program

LOS ANGELES.—The expanded wildcatting program being carried out by California operators continues to yield new oil and gas discoveries, ranging from Orange County on the south to Yolo County in the Sacramento Valley area on the north.

Developments in the San Joaquin Valley region were particularly impressive. One-half mile west of Bacon Hills production a new pool discovery was completed and about ½ mile northwest of this discovery an outpost was in process of completion. At the Belgian Anticline field a formation test indicated productive limits would be moved ½ mile northwest. About 2 miles east of Greeley production, near Rosedale, a wildcat which earlier had indicated it would make a Stevens sand producer was to be plugged back for completion in that pay.

The new Bacon Hills discovery, in 29-28s-20e, was Superior Oil Co. 54-20 Theta. It was completed at 2,185-2,210 ft. in a new upper middle-Miocene sand for 77 bbl. of 22°-gravity crude daily. About 2,000 ft. northwest of the discovery, The Texas Co. 1 Tolco was swabbing at the rate of 220 bbl. daily from the interval at 2,560-2,600 ft.

At Belgian Anticline, Ohio Oil Co. 1 Tulare fee yielded 1,290 ft. of 34°-gravity crude following a 1-hour formation test at 6,044-56 ft. Located in 19-30s-22e, or about ½ mile northwest of production, the wildcat continued to core ahead after making the test.

At Humble Oil & Refining Co. 1 Rosedale-Stevens community, 2 miles east of Greeley field, 15-29s-26e, operator was running 7-in. casing after drilling to 7,321 ft. Previously a drill-stem test at 5,921-45 ft., in the Stevens which was topped at 5,892 ft., indicated the wildcat would make a producer.

In the Sacramento Valley region, a development was the successful completion of a ¾-mile south outpost to Pleasant Creek gas field in Yolo County. The wildcat, Mohawk Petroleum Corp. 1 Pleasant Creek Unit 5 in Section 17-8n-1w, was completed at 2,930-45 ft. for a daily rate of 6,300,000 cu. ft. of dry gas through a 35/64-in. bean.

In the Los Angeles Basin region, Algonquin Oil Co. 1 "Well" at Sunset Beach in Orange County was reported pumping 100 bbl. of 17°-gravity crude daily. The wildcat, after being drilled to 4,639 ft., was completed in 50 ft. of sand above the plugged back depth of 4,500 ft.

Among the new wildcats staked was Universal Consolidated Oil Co. 18-5 McVicar about midway between the discovery well of Camden field and Santa Fe Drilling Co.'s recent 1¼-mile northwest extension or new field opener. In Los Angeles County's San Fernando reservoir area, Los Nietos staked location for 1 Hartman in Section 1-2n-16w. It will be in the same section as the company's 1 Edwards, which for a month late last year produced a small amount of oil from an upper Miocene sand at 3,906-80 ft.

**CALIFORNIA SUCCESSFUL WILDCATS**

Kern County: New upper middle-Miocene zone discovery in West Bacon Hills field—Superior Oil Co. 54-20 Theta, SE NE 20-28s20e, flowed 77 bbl. oil per day, perf. 2,185-2,210 ft., TD 4,563 ft., redrilled to 2,210 ft., elev. 999 ft.

Los Angeles County: New field discovery in Castiac area, 1¾ mi. NW Honor Farm field—Ted Sterling 1 Ryme-Fisher, NE NE 35-5n-17w, flowed estimated 500 bbl. 32°-gravity oil per day, perf. 4,632-96 ft., 30/64-in. bean, TD 4,742 ft., elev 1,513 ft.

New field discovery in La Habra Heights area, ½ mi. S Sansinena pool, R. E. Bering 1 York, SE SE 30-2s-10w, flowed 146 bbl. 21.5°-gravity oil per day, perf. 2,604-3,149 ft., 13/64-in. bean, TD 3,749 ft., PB 3,150 ft., elev. 645 ft.

**CALIFORNIA WILDCAT FAILURES**

Fresno County, Burrel area: L. M. Lockhart 1-21 Burrel, 21-16s-18e, dry, TD 7,902 ft., elev. 207 ft.

Kern County, Edison area: Rothschild Oil Co. 5 Guimarra, 22-30s-29e, dry, TD 3,150 ft.

Tejon Hills area: Leroy C. Gould, Opr., 24-1 Ranch, 24-11n-18w, dry, TD 573 ft., elev. 1,060 ft.

Tunis Creek area: Standard Oil Co. 29-29 Tejon 3, 29-11n-18w, dry, TD 2,449 ft., elev. 855 ft.

Los Angeles County, Placerita area: Rothschild Oil Co. 1 Wickham-Ferrier, 32-4n-15w, dry, TD 1,652 ft., elev. 1,800 ft.

Riverside County, Anza area: C. H. Bent 1 Bent, 21-7s-3e, dry, TD 383 ft. in granite, elev. 3,504 ft.

Santa Barbara County, Cuyama area: Richfield Oil Corp. 37-22 Kirschenmann, 22-10n-26w, dry, TD 9,159 ft., elev. 2,781 ft.

Corral de Quati area: Shell Oil Co. 1 Orton, 23-7n-30w, dry, TD 4,150 ft., elev. 898 ft.

Summerland area: T & T Oil Co. 1 Brambilla, 16-4n-26w, dry, Vaqueros sand 1,230 ft., TD 1,326 ft., elev. 224 ft.

Sonoma County, Petaluma area: Tide Water Associated Oil Co. 1 Mangels, 14-4n-6w, dry, TD 3,385 ft., elev. 541 ft.

# Appalachian-Ohio

## Three Dry Holes Logged in Garrett County, Maryland

PITTSBURGH.—Three dry holes were reported this week in Garrett County, Maryland, where considerable drilling activity is under way. These failures were: Union Drilling Co. 1 Ray Lichty, Columbian Carbon Co. 1 GW-1506 Emily F. Moone, and Bordan Oil Co. 1 Will Robeson.

Meanwhile in this area, other wells drilling included: Eberly & Snee 3 fee, elevation 2,462 ft., running casing at 3,683 ft., with Tully recorded at 3,105 ft., and Onondaga at 3,683 ft.; Blaho Oil & Gas Co. 1 Dorcie Rumer, elevation 2,490 ft., shut down to case after encountering Onondaga at 3,799 ft.; George Jackson 1 A. M. Calhoun, elevation 3,799 ft., drilling at 3,447 ft., after topping Oriskany at 3,447 ft.; Downing Oil Co. 1 McClain, elevation 2,505 ft., casing at 3,726 ft., after topping Tully at 3,160 ft., and Onondaga at 3,706 ft.; and New York State Natural Gas Corp. digging cellar at its 1-N-261 Daisy Smith.

Two new locations have been made in the Portland district of Preston County, West Virginia, on the Kingwood quadrangle. They are: Hope Natural Gas Co. 8676 Sarah J. Creamer, elevation 2,097 ft., 10-mile south of Lat. 39° 25′ and 4.05 miles west of Long. 79° 30′; and Manufacturers Light & Heat Co. 4116 Enzer and Annie E. Whitehair, elevation 2,209 ft., .55-mile south of Lat. 39° 25′ and 3.95 miles west of Long. 79° 35′.

In the Jefferson district of Nicholas County, Columbian Carbon Co. 9-GW-1166 Flynn Coal & Lumber Co. showed 4,091,000 cu. ft. of gas in shale at a total depth of 2,000 ft.

Twenty-three new locations have been made, in the following areas: Center and DeKalb districts, Gilmer County; Court House district, Lewis County; Laurel Hill district, Lincoln County; Big Creek district, McDowell County; Summersville district, Nicholas County; McKimm and Union districts, Pleasants County; Portland district, Preston County; Pocatalico and Union districts, Putnam County; Marsh Fork district, Raleigh County; Clay and Grant districts, Ritchie County; Harper district, Roane County; Union district, Tyler County; and Stonewall district, Wayne County.

Three new locations were made in Southwest Pennsylvania; in Boggs Township, Armstrong County; and East Pine Run and Nottingham townships, Washington County.

**MARYLAND WILDCAT FAILURES**

Garrett County: Union Drilling Co. 1 Ray Lichty, elev. 2,483 ft., dry, TD 3,800 ft.

Columbian Carbon Co. 1-GW-1506 Emily F. Moon, elev. 2,450 ft., dry, Oriskany sand 4,154 ft., show of gas, TD 4,265 ft.

Borden Oil Co. 1 Will Robeson, elev. 2,520 ft., dry, Onondaga 4,862 ft., chert 4,918 ft., Oriskany sand 4,959 ft., show of gas and salt water 4,918 ft., 4,973 ft., 5,002 ft., TD 5,002 ft.

**OHIO**

The western part of Coshocton County is receiving more attention as the result of New Castle pool and wildcats drilling and planned. Two gas wells came in this week, one an offset to a wildcat discovery and the other in an old field. Oxford Oil Co. 3 C. W. Young, Section 23, Clark Town-


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ship, logged the lower Clinton at 3,458-87 ft. with an open flow of 1,100,000 cu. ft. of gas and was tubed natural. Natural Gas Co. 1 Caroline Kirch, Lot 6, Tiverton Township, gaged 1,000,000 cu. ft. of gas natural, a further report will be made next week on this well.

Ohio Fuel Co. 1 Virgil Morris, Section 19, Knox Township, Holmes County, missed the Newburg sand and was drilled on down to the Clinton at 2,751-77 ft., where 1,130,000 cu. ft. of gas, natural, was found. A north offset has been staked. In Ripley Township, Holmes County, the same company's 1 William Ross, Section 32, made 945,000 cu. ft. of gas, natural, from the Clinton at 3,123-43 ft.

C. H. & D. Co. 7 Mary Walser, Section 27, Hopewell Township, Perry County, had a fair showing of oil in the Clinton at 2,890-2,930 ft. It increased to 50 bbl. in 24 hours after shot.

# Rocky Mountain

## Two Tests Have Oil Shows In Denver-Julesburg Basin

DENVER.—Two new operators to the Denver-Julesburg Basin have found staining in wildcats and are now testing. Lario Oil & Gas Co. topped the "D" sand at 4,791 ft. and at 4,801 ft., total depth, is now testing at 1 Blessing, SE SW NE 10-1s-54w, in the Blessing area, Washington County, Colorado. Fair staining was logged in the well-developed sand. Lion Oil Co. 1 Rediess Davidson, SE NE NE 7-1n-56w, in the South Fort Morgan area, Morgan County, topped the "D" sand at 5,215 ft., structurally high, and found staining. The well is at 5,224 ft., total depth, with the operator testing. This is Lario's first drilling in the current Rocky Mountain exploratory program and Lion's second wildcat for the Basin. Shows of oil, possibly in the Pennsylvanian, have also been logged by Brown Drilling Co. of Los Angeles at 1 Pyle, NE NE NW 21-4n-45w, a wildcat on an Ohio Oil Co. farmout in Yuma County, east of previous production. The well is at 5,045 ft., total depth, and Brown is making drill-stem tests. There are now 21 active wildcats (including locations announced) in the Colorado portion of this basin.

No new developments of importance were announced for the important Williston Basin wildcats now being drilled by Amerada Oil Corp., The Texas Co., and Shell Oil Co. Texas recovered 360 ft. of watery mud on a 90-minute drill-stem test from 7,572-7,692 ft., possibly in the Madison, at 1 Northern Pacific, C NE NE 35-15n-54e, Baker-Glendive, Dawson County, Montana. The Charles at 6,945 ft. was the last formation top reported. Shell recovered muddy salt water, carbon dioxide cut, on a drill-stem test at 8,577-8,658 ft. in the Devonian at 1 Northern Pacific, SE NW NW 19-23n-50e, in the Richey area, Dawson County. The Charles was topped at 6,695 ft., Mission Canyon 7,298 ft., and Lodgepole 7,750 ft. At the Shell Pipe Unit well, southeast of the Richey and Baker-Glendive wildcats, the Charles was topped at 7,100 ft., Mission Canyon 7,565 ft., and Lodgepole 7,976 ft. On a drill-stem test in the Mission Canyon between 7,512-7,607 ft., the recovery was 1,350 ft. of slightly oil and gas-cut mud and 990 ft. of oil and gas-cut water with 1,920 ft. of slightly gassy water with a trace of oil. The operator is coring below 8,396 ft. on the wildcat. Across the line in North Dakota, Amerada Petroleum Corp. is drilling below 8,800 ft. at 1 Bakken, C SW NW 12-157n-95w, wildcat in the Tioga area, Williams County. This well made sulfur water on a test at 8,486-8,577 ft. It recently flowed oil on a drill-stem test in the Madison, between 8,304-60 ft.

Shows of oil in the Embar at Stanolind Oil & Gas Co. 1 Pepper, NW NW NE 26-55n-97w, wildcat in the Coon Creek area, Big Horn County, Wyoming, caused interest in the well this week. However, on a drill-stem test in the top of the formation, the well made only a small amount of drilling mud. Staining was logged in the zone at 7,732-42 ft. and the operator is now drilling below 7,802 ft.

**COLORADO WILDCAT FAILURES**

Mustang Creek, Lincoln County: C. M. Rood 1 White, SE SE SW 19-13s-56w, TD 3,816 ft., dry.

Fleming, Logan County: Deep Rock Oil Co. 1 State, SW SE NW 1-9n-49w, TD 4,545 ft., dry.

Northeast Logan: Plains Exploration Co. 1 Brainerd, NW NW SE 29-8n-53w, TD 5,415 ft., dry.

North Sterling: Sohio Petroleum Co. 1 H. E. McKenzie, NE SE SE 10-8n-52w, TD 4,945 ft. dry.

Plains Exploration Co. 1 Morrison, NW NW NW 24-8w-54w, TD 5,570 ft. dry.

East Greasewood, Weld County: C. C. Thomas and Earl Cranston 1 McLellon-Kokes, SW SE NW 23-6w-60w, TD 6,756 ft., dry.

**WYOMING WILDCAT FAILURES**

Haystack, Carbon County: C. H. Murphy 1 Unit, C NE NW 14-23n-86w, TD 7,472 ft., dry.

Owl Creek, Hot Springs County: Westates Petroleum Co. 1 Government-Carlson, C NE SE 34-44n-98w, TD 5,230 ft., dry.

Southwest Castle Creek, Natrona County: E. N. Hope 1 Government, SE SE SW 1-37n-82w, TD 4,215 ft., dry.

E. N. Hope 2 Government, SE SE NW 14-38n-82w, TD 1,316 ft., dry.

E. N. Hope 3 Government, NW SW SE 29-38n-82w, TD 4,280 ft., dry.

E. N. Hope 4 Government, NE NE NE 32-36n-81w, TD 3,755 ft., dry.

E. N. Hope 5 Government, NW NW NW 29-35n-81w, TD 3,080 ft., dry.

West Teapot: Tomberlin Petroleum Corp., Crude Oil Producers 1 Government, C SW SW 2-38n-79w, TD 5,430 ft., dry.

Bruce anticline, Washakie County: Ame-

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rada Petroleum Corp. 1 Unit, NW SE SE 7-45n-89w, TD 5,088 ft., dry.

**MONTANA WILDCAT FAILURES**

North Columbus, Stillwater County: Johnson Oil Supply Co. 1 State, SW SW SW 36-1n-20e, TD 4,943 ft., dry.

Mosser, Yellowstone County: Shelbourne Oil Co. 1 Government, SE SE NW 34-3s-24e, TD 2,476 ft., dry.

**UTAH WILDCAT FAILURE**

Upper Valley, Garfield County: California Co. 1 Unit, C SW NW 12-36s-1e, TD 10,120 ft., dry.

**NORTHERN NEW MEXICO WILDCAT FAILURE**

Cedar Hill, San Juan County: Primo Oil Co. 1 Primo-Federal, NE SE SE 24-32n-11w, TD 5,560 ft., dry.

**WESTERN NEBRASKA SUCCESSFUL WILDCAT**

Kimball County: Wytex Petroleum Co.-Derby Oil Co. 1 Dunn, NE NE SE 3-13n-53w, TD 5,780 ft., pumped 86 bbl. oil and 19 bbl. slightly salty water, Pierre 1,370 (?) ft., Niobrara 4,683 ft., Ft. Hays 4,985 ft., Codell 5,067 ft., Carlile 5,078 ft., Greenhorn 5,269 ft., Muddy 5,526 ft., base Muddy 5,558 ft., "J" sand 5,648 ft., base "J" sand 5,708 ft.

**WESTERN NEBRASKA WILDCAT FAILURES**

Northeast Harrisburg, Banner County: Sinclair Oil & Gas Co. 1 Owen Gifford, SW SW SW 18-19n-55w, TD 6,024 ft., dry.

East Sidney, Cheyenne County: Baxter Drilling Co. 1 SW NW NE 35-14n-49w, TD 4,709 ft., dry.

## Louisiana-Arkansas

### Official Completion Opens Sentell Pool

SHREVEPORT.—The tentative name of "Sentell" field had been given to the area opened by Butler-Johnson Service Corp. 1 J. M. Sentell, approximately 4 miles north of Shreveport. Located 1,042 ft. from the north line and 3,186 ft. from the west line of Section 35-19n-14w, Caddo Parish, the strike reported an open flow of 37,000,000 cu. ft. of gas plus 15 bbl. of condensate per million cubic feet from perforations in the Bodcaw (Cotton Valley) at 8,324-46 ft. Total depth is 8,350 ft.

Operators hope the area will become a two-parish producing field, as Bossier Parish is only slightly ¾ mile east of the new well. An offset has already been spotted ½ mile northwest of the discovery. The new venture will be the same operators' 1 Sibley in Section 26-19n-14w.

**Arkansas.**—Stanolind Oil & Gas Co. recompleted its Fort Lynn discovery, 1,980 ft. from the south and 1,983 ft. from the east lines of Section 20-18s-27w, Miller County, for 2,270,000 cu. ft. of gas and 61 bbl. of condensate from perforations in an upper Rodessa interval at 6,056-65 ft. Shut-in bottom-hole pressure was 2,726 psi., while the flow recorded a working pressure of 2,205 psi.

Testing has started at E. G. Bradham 1 Cooper & Cook, 200 ft. northwest of the center of SW SE Section 3-17s-23w, in Lafayette County. This well is between Buckner and McKamie fields. It topped the objective Smackover limestone at 8,350 ft., and found porosity at 8,356 ft. A core at 8,344-81 ft. had fair porosity and stain, and another core at 8,381-88 ft. recovered limestone with a slight stain and salty taste. A drill-stem test to total depth, with packer set at 8,340 ft., recovered 120 ft. of oil and 150 ft. of salt water.

**NORTH LOUISIANA SUCCESSFUL WILDCAT**

Webster Parish: Skelly Oil Co. 1 E. L. Stewart, 466 ft. N and E SWc 19-19n-

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10w, flowed 151 bbl. oil from Pettit at 3,978-86 ft., 3,990-98 ft., and 4,006-09 ft., TD 7,780 ft.

**NORTH LOUISIANA WILDCAT FAILURES**

Catahoula Parish: Hunt Oil Co. and Gulf Refining Co. 63 Louisiana Delta Lumber Co., C NE NE 15-3n-5e, dry, TD 7,500 ft.

Hunt Oil Co. and Gulf Refining Co. 61 Louisiana Delta Lumber Co., C NE SW 28-6n-5e, dry, TD 6,000 ft.

Concordia Parish: A. C. Duerr et al. 1 A. C. Calvery, C NW SW 7-7n-8e, dry, TD 6,508 ft.

**ARKANSAS WILDCAT FAILURES**

Calhoun County: W. H. Bryant 1 D. H. Hanford est., SW NW SE 21-14s-16w, dry, TD 2,518 ft.

Union County: McAlester Fuel Co. 1 W. H. Harry, Jr., "A," 330 ft. N and 380 ft. E SWc NW NE 32-16s-12w, dry, TD 4,005 ft.

# Canadian Fields

## North Tangent Gas Area Gets Two Extensions

CALGARY.—This week the North Tangent area of Northwest Alberta came through with a pair of stepout drillers that extended the natural gas area about 4 miles to the northwest and that same distance to the southwest. One of the wells, in addition to finding gas in the Triassic dolomite, had a substantial flow of gas in the Triassic sand section immediately below the dolomite. Results of both wells are expected to add considerably to the gas reserve in that area, which as yet has a considerable amount of extension and exploratory drilling ahead before full extent of the reservoir can be determined.

The Tangent project is being carried out by the Hudson's Bay Oil & Gas Co. and Union Oil Co. of California team, in an area located some 25 miles southwest of Peace River town. The first extension, H.B.-Union-North Tangent 4, in LSD 16, 5-81-24w5, found natural gas at rates up to 20,000,000 cu. ft. daily in the Triassic dolomite, and also indicated that commercial gas production could be obtained from the Gething and Peace River sands.

The second success in that area, H.B.-Union-North Tangent 5, in LSD 16, 20-80-24w5, found 2,540,000 cu. ft. of gas daily in the Triassic dolomite during a drill-stem test from 2,872-88 ft. The first test in the Triassic sand was run from 2,897-2,915 ft., and gave a gas flow of 260,000 cu. ft. daily. A second test, from 2,918-31 ft., flowed natural gas to the surface in 1 minute, at the rate of 2,120,000 cu. ft.

(Continued on page 164)

# Central Area

**ILLINOIS**

Discovery of another producing area for Clay County is indicated by oil showings encountered by J. H. Gilliam and associates 1 Chester Jones, NE SE NW 3-3n-8e. The location is 3 miles northeast of Clay City and more than a mile from nearest other production, being southeast of the East Sailor Springs pool and northeast of the North Clay City pool.

Showings were in Rosiclare lime, logged at 3,037-41 ft. A drill-stem test of this interval with tester open 2 hours filled 600 ft. of clean oil and 180 ft. of mud-cut oil with 120 ft. of water. Indicated bottom-hole pressure was 1,163 psi. Hole has been drilled to 3,140 ft. and casing run for completion.

Stanford Oil Co. has made a promising Silurian lime discovery in the area 2 miles southwest of Posey and 9 miles south of Carlyle, in southern Clinton County, near the Washington County line, where its 1 School Board, NW NE NE 26-1n-3w, got 2,034 ft. of clean oil in a drill-stem test at 2,597-2,611 ft. Gravity of the oil is 42°.

**INDIANA**

Charles C. Clark & Son and F. R. Stocker have opened another new productive spot in the Monroe City area, Knox County, where a succession of discoveries have been made within the past year. Their 1 Myers, Military Donation 179-2n-9w, pumped 116 bbl. of oil in the first 24 hours while testing saturation found in McClosky lime at 1,620-23 ft. The well, 5 miles southwest of Monroe City, is 1½ miles from other production.

**WESTERN KENTUCKY**

Iley B. Browning & Sons 2 Cottingham, 19-N-23, McClosky lime discovery well in the active Knob Lick pool, Webster County, flowed initially at the rate of 40 bbl. of oil per hour with 1,000,000 cu. ft. of gas daily after perforating casing at 2,635-53 ft. Flow at times, however, has been as little as 9 bbl. per hour with relatively high gas-oil ratios. Other wells in pool, located 4 miles west of Sebree, produce from the Palestine, Waltersburg, and Hardinsburg sands.

**EASTERN KENTUCKY**

In the recently revived drilling program in old Pilot pool of Estill and Powell counties, several wells have been completed. Walter Roung drilling on 1 A. C. Sparks heirs, on Evans Branch in District 18, made 25 bbl. of oil daily from the Corniferous lime at 754-93 ft., total depth. Lucsom Corp. 8 H. T. Williams, on Billys Fork in the same district, was brought in for 8 bbl. of oil daily from the Corniferous at 824-54 ft., total depth, and the same operator's 9 H. T. Williams made 6 bbl. daily from the same formation at 904-72 ft., total depth.

In Indian Creek pool of southern Menifee County, Pieratt and Williams have completed National Forest Reserve Tract 2, on Indian Creek, for 120 bbl. of oil with 10 per cent water and basic sediment. The producing formation is the Corniferous lime, 1,120-26 ft., total depth. This well is in the heavy crude Ragland area.

**MICHIGAN**

Detroit River zone gas was reported to be showing through a hole full of water at Louis Rose 1 Brocht, N½ NE SE 2-20n-6w, Winterfield Township, Clare County, deep wildcat. Gas started to show in the Monroe and Detroit River zones at 4,695-4,701 ft. and an increase was reported through the hole full of water at 4,770-77 ft. At 4,890-4,900 ft. another increase in the gas pay was logged, which headed up and flowed at least some of the water from the hole.

This deep test in Cranberry Lake Stray gas storage field, is scheduled to be drilled to the Richfield section for oil and gas at about 5,400 ft. When 5-in. casing is run it will be set in such a manner to allow operator to conduct a dry hole test of these gas showings if well is not successful in the Richfield.

After acid treatment in the Detroit River sour oil pay, Socony-Vacuum Oil Co. 1 Pierson, NE NW NW 11-17n-1e, Billings field, Gladwin County, was reported to have pumped and flowed in excess of 200 bbl. of oil in 24 hours. Further production tests are being run before a potential of this new producer is announced. The well flowed at the rate of 87 bbl. of oil a day, natural, from the pay logged at 4,068-82 ft. It was acidized with 1,000 gal. This is the second deeper horizon producer to be drilled in Billings field which was first discovered in the Dundee. The 1 Pierson is the best producer, regardless of horizon, in the pool.

**ILLINOIS SUCCESSFUL WILDCAT**

Effingham County: D. H. Bolin 1 Hetzel, SW SW NE 33-6n-5e, IP 20 bbl., Rosiclare 2,461-62 ft. and McClosky 2,488-92 ft., TD 2,496 ft.

**ILLINOIS WILDCAT FAILURES**

Bond County: T. S. Doran 1 Jenne, SE SW NE 12-4n-12w, dry, TD 1,200 ft.

Christian County: Collins Brothers 1 Fuchs, NW NW SE 10-11n-1e, dry, TD 2,890 ft.

Clinton County: Paul Schoendienst 1 Kannal, SE SE NE 10-1n-3w, dry, TD 1,194 ft.

Fayette County: D. H. Bolin 1 Reed, NW SW NW 10-5n-3e, dry, TD 2,240 ft.

R. H. Troop 1 Adams, SW SW SW 11-8n-2e, dry, TD 1,824 ft.

Franklin County: Columbus Exploration Co. 1 Pearce, SW SW SE 7-5s-4e, dry, TD 3,181 ft.

National Associated Petroleum Co. 1 Lipe Ferris heirs-Jackson, SW SE SE 36-4s-6e, dry, TD 3,620 ft.

Jefferson County: Tex Harvey Oil Co. 1 De Witt heirs, NW SE SE 19-1s-3e, dry, TD 2,607 ft.

(Continued on page 165)


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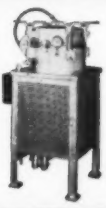

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# With 4,456 Completions, August Set New Record in Wells, Rigs, and Footage

**by Polly DeArmond**

DURING August 1951, operators set a new record for number of wells and footage drilled in any one month in the history of the industry. The number of active rigs operating at the end of the month was also the highest it has ever been.

August was also the peak month in 1950, so far the record year for drilling operations. This past August's 4,456 completions and 17,174,411 ft. represent increases of 368 wells (or 9 per cent) and some 2,109,000 ft. (or 14 per cent) over those corresponding 31 days last year. Further analysis of completion and footage figures reflect that average depth increased almost 170 ft. per well in the August-vs.-August comparison. While the greatest gain occurred in the 2,500-5,000-ft. depth classification between the two months considered, over one-third of the total increase in completions fell into the large category of wells drilled below 5,000 ft.

Each of the seven general areas of the United States showed increases in both new completions and footage over August 1950. In five out of the seven, the footage gain exceeded that of the wells drilled.

**Rocky Mountain.**—Montana, Wyoming, Colorado, Utah, and miscellaneous western states combined, reflected this surge in deeper drilling with an increase of 104,000 ft. (up 25.3 per cent) for only 3 additional wells completed (a gain of 2.7 per cent).

**Southwest.**—Texas and New Mexico showed gains of 82 completions or 4.9 per cent, and 947,000 ft., or 13.2 per cent, over the same month of the previous year.

**California.**—The number of wells increased 27, or 6.5 per cent, and footage jumped 95,000 ft., or 13.3 per cent.

**North Central.**—This section, made up of Ohio, Kentucky, Illinois, Indiana, and Michigan, reported gains of 11 completions (1.6 per cent) and 160,000 ft. ( 11 per cent), compared with August of the previous year.

**Southern.**—The group consisting of Louisiana, Arkansas, Mississippi, Alabama, Georgia, Florida, and Tennessee, inched ahead 3 wells, less than 1 per cent, but climbed 96,000 ft., or 5.4 per cent, in footage.

**Mid-Continent.**—This division (including Oklahoma, Kansas, and Nebraska) recorded the greatest gain in completions. There were 214 more wells (an increase of 26 per cent) completed in August 1951 than during the same month in 1950. Footage was up 661,000 ft., or 22.3 per cent.

**Appalachian.**—Including the shallow cable tool states of New York, Pennsylvania, West Virginia, and Maryland, this area noted a slight rally from the downward trend of the past 2½ years or so. Completed wells were up 28, or 9.9 per cent, with an accompanying gain of 46,000 ft., or 8.3 per cent.

## SUMMARY OF COMPLETIONS, AUGUST 1951

| | Total comp | Oil | Gas | Dry | Under 2,500 ft. | 2,500-5,000 ft. | 5,000-7,500 ft. | 7,500-10,000 ft. | 10,000-12,500 ft. | Over 12,500 ft. | Total footage | Rigs and drilling |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| New York | 73 | 37 | 0 | 36 | 73 | 0 | 0 | 0 | 0 | 0 | 105,600 | 48 |
| Pennsylvania | 179 | 82 | 18 | 79 | 164 | 6 | 9 | 0 | 0 | 0 | 318,148 | 190 |
| West Virginia | 54 | 3 | 39 | 12 | 23 | 28 | 3 | 0 | 0 | 0 | 158,714 | 212 |
| Maryland | 4 | 0 | 1 | 3 | 0 | 4 | 0 | 0 | 0 | 0 | 17,052 | 39 |
| Ohio | 102 | 28 | 26 | 48 | 48 | 53 | 1 | 0 | 0 | 0 | 230,532 | 148 |
| Kentucky | 132 | 53 | 19 | 60 | 102 | 30 | 0 | 0 | 0 | 0 | 307,873 | 101 |
| Illinois | 247 | 99 | 0 | 148 | 100 | 147 | 0 | 0 | 0 | 0 | 602,055 | 260 |
| Indiana | 148 | 54 | 2 | 92 | 121 | 27 | 0 | 0 | 0 | 0 | 266,299 | 241 |
| Michigan | 88 | 24 | 4 | 60 | 54 | 34 | 0 | 0 | 0 | 0 | 201,320 | 95 |
| Kansas | 475 | 241 | 47 | 187 | 44 | 429 | 2 | 0 | 0 | 0 | 1,624,970 | 448 |
| Nebraska | 15 | 6 | 0 | 9 | 4 | 7 | 4 | 0 | 0 | 0 | 60,865 | 37 |
| Oklahoma | 546 | 300 | 29 | 217 | 168 | 276 | 77 | 10 | 15 | 0 | 1,944,093 | 848 |
| Texas | 1,709 | 999 | 87 | 623 | 415 | 596 | 488 | 164 | 36 | 10 | 7,921,850 | 1,668 |
| North | 259 | 130 | 0 | 129 | 126 | 98 | 35 | 0 | 0 | 0 | 777,269 | 241 |
| West Central | 263 | 109 | 4 | 150 | 92 | 126 | 45 | 0 | 0 | 0 | 888,106 | 253 |
| West | 506 | 405 | 3 | 98 | 78 | 120 | 242 | 39 | 18 | 9 | 2,829,388 | 596 |
| Panhandle | 84 | 32 | 47 | 5 | 10 | 72 | 2 | 0 | 0 | 0 | 259,019 | 79 |
| East | 121 | 68 | 2 | 51 | 20 | 44 | 36 | 21 | 0 | 0 | 604,621 | 101 |
| Gulf Coast | 231 | 131 | 16 | 84 | 17 | 67 | 62 | 71 | 13 | 1 | 1,425,946 | 229 |
| Southwest | 245 | 124 | 15 | 106 | 72 | 69 | 66 | 33 | 5 | 0 | 1,137,501 | 169 |
| Louisiana | 229 | 125 | 11 | 93 | 58 | 37 | 45 | 40 | 36 | 13 | 1,409,713 | 291 |
| Northern | 141 | 71 | 8 | 62 | 57 | 33 | 29 | 15 | 7 | 0 | 567,260 | 122 |
| Southern | 88 | 54 | 3 | 31 | 1 | 4 | 16 | 25 | 29 | 13 | 842,453 | 169 |
| Arkansas | 50 | 23 | 2 | 25 | 13 | 30 | 5 | 1 | 1 | 0 | 173,329 | 30 |
| Mississippi | 47 | 15 | 0 | 32 | 0 | 15 | 24 | 6 | 2 | 0 | 284,713 | 35 |
| Ala., Ga., Fla. | 3 | 0 | 0 | 3 | 0 | 1 | 2 | 0 | 0 | 0 | 15,623 | 5 |
| Tennessee | 5 | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 4,558 | 10 |
| Montana | 26 | 17 | 1 | 8 | 21 | 4 | 1 | 0 | 0 | 0 | 56,750 | 77 |
| Wyoming | 66 | 40 | 2 | 24 | 6 | 28 | 28 | 5 | 1 | 0 | 336,875 | ‡220 |
| Colorado | 20 | 8 | 0 | 12 | 1 | 3 | 16 | 0 | 0 | 0 | 97,362 | 68 |
| Utah | 3 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 24,141 | ¶30 |
| New Mexico | 44 | 21 | 17 | 6 | 9 | 18 | 12 | 3 | 1 | 1 | 202,179 | 187 |
| California | 191 | 131 | 4 | 56 | 48 | 87 | 35 | 12 | 8 | 1 | 809,797 | 335 |
| Total August 1951 | 4,456 | †2,307 | 310 | *1,839 | 1,477 | 1,860 | 751 | 242 | 101 | 25 | 17,174,411 | ‡5,623 |
| Total July 1951 | 3,726 | 1,896 | 242 | 1,588 | 1,271 | 1,509 | 636 | 207 | 87 | 16 | 14,160,183 | 5,549 |
| Total August 1950 | 4,088 | 2,276 | 262 | 1,550 | 1,472 | 1,628 | 645 | 234 | 93 | 16 | 15,065,005 | 4,911 |
| Cumulative 1951 | 28,814 | 15,397 | 1,883 | 11,534 | 9,487 | 12,076 | 4,727 | 1,655 | 737 | 132 | 111,067,552 | |
| Cumulative 1950 | 28,274 | 16,169 | 1,853 | 10,252 | 10,391 | 11,236 | 4,443 | 1,474 | 636 | 94 | 103,449,129 | |
| Alberta, Canada | 125 | 78 | 9 | 38 | 19 | 39 | 35 | 0 | 0 | 0 | 503,201 | |
| Cumulative 1951 | 759 | 514 | 48 | 197 | 62 | 367 | 286 | 12 | 0 | 0 | 3,010,980 | |
| Cumulative 1950‖ | 643 | 484 | 28 | 131 | 34 | 441 | 160 | 7 | 1 | 0 | 2,506,127 | |

*Incl. 154 service wells: N. Y. 36, Pa. 73, Ohio 2, Ill. 1, Ind. 1, Mich. 7, Kans. 4, Okla. 24, No. Tex. 2, S.W. Tex. 1, Miss. 1, Calif. 2. †Incl. 39 distillate wells: Kans. 1, Okla. 10, W. Tex. 4, E. Tex. 8, Tex. Gulf 3, S.W. Tex. 2, No. La. 4, So. La. 6, Miss. 1. ‡Incl. all wells rigged up and/or drilling at month end. §Incl. 8 Dak. rigs. ¶Incl. 4 misc. rigs (Idaho, Nev., and Ariz.). ‖Revised.

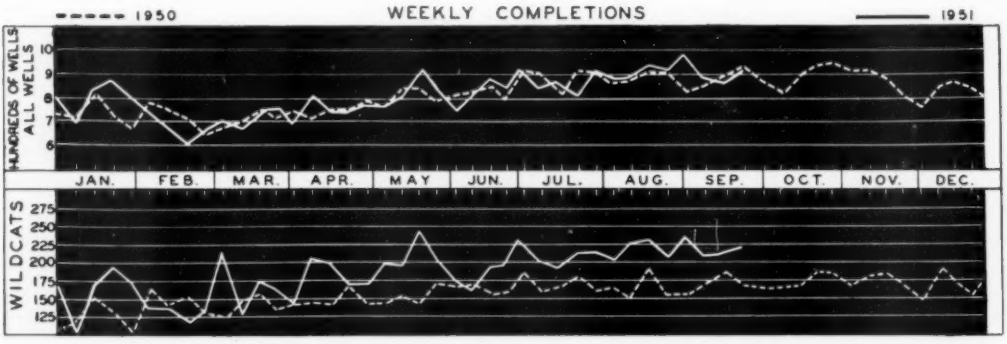
# CURRENT STATISTICS

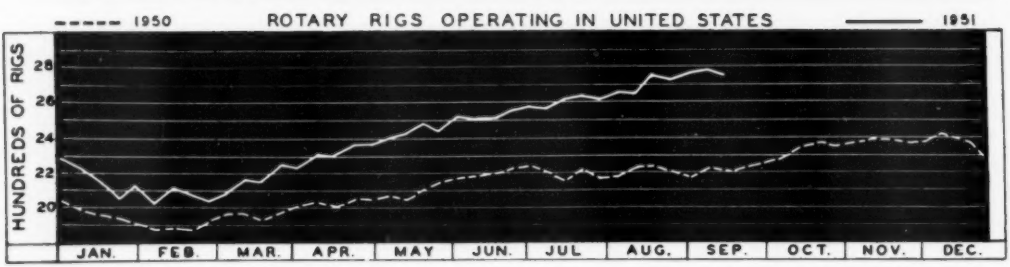
## EXPLORATION

### WEEKLY WELL COMPLETIONS . . . WEEK ENDED SEPTEMBER 22, 1951

| | Total of all wells | | | | | Sept. 22 | | Wildcat completions and discoveries | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | Cumulative total, 1951 | | | | |
| | Comp. | Oil | Gas | Dry | Footage | 1951 | 1950 | Oil | Dist. | Gas | Dry | Total | Oil | Dist. | Gas | Dry | Total |
| New York | 18 | 9 | 0 | [1]9 | 26,316 | 471 | 509 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pennsylvania | 37 | 20 | 5 | [1]12 | 70,020 | 1,046 | 982 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| West Virginia | 15 | 0 | 13 | 2 | 42,235 | 414 | 483 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 6 | 15 |
| Ohio | 26 | 5 | 7 | [1]14 | 69,870 | 693 | 726 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 5 | 16 | 22 |
| Indiana | 39 | 10 | 0 | 29 | 77,683 | 932 | 1,159 | 0 | 0 | 0 | 18 | 18 | 34 | 0 | 1 | 263 | 298 |
| Kentucky | 34 | 17 | 0 | 17 | 62,069 | 875 | 804 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | 1 | 112 | 132 |
| Illinois | 48 | 17 | 0 | 31 | 114,070 | 1,718 | 1,999 | 1 | 0 | 0 | 14 | 15 | 56 | 0 | 0 | 399 | 455 |
| Michigan | 14 | 2 | 0 | 12 | 32,646 | 563 | 637 | 0 | 0 | 0 | 10 | 10 | 17 | 0 | 7 | 218 | 242 |
| Kansas | 99 | 48 | 20 | [1]31 | 316,051 | 3,188 | 2,809 | 5 | 0 | 1 | 12 | 18 | 156 | 1 | 13 | 636 | 806 |
| Nebraska | 3 | 1 | 0 | 2 | 16,513 | 166 | 76 | 1 | 0 | 0 | 2 | 3 | 7 | 0 | 1 | 83 | 91 |
| Oklahoma | 95 | 46 | 3 | 46 | 354,340 | 4,064 | 3,913 | 4 | 1 | 1 | 18 | 24 | 139 | 4 | 17 | 528 | 688 |
| Texas | 306 | 193 | 8 | 105 | 1,510,082 | 12,074 | 11,933 | 14 | 1 | 0 | 65 | 80 | 534 | 41 | 85 | 2,495 | 3,155 |
| North Central (Dist. 7-B & 9) | 103 | 51 | 0 | 52 | 372,499 | 3,664 | 3,609 | 7 | 0 | 0 | 33 | 40 | 256 | 2 | 12 | 1,067 | 1,337 |
| West (Dist. 7-C & 8) | 112 | 92 | 0 | 20 | 690,291 | 3,671 | 3,578 | 3 | 0 | 0 | 13 | 16 | 131 | 9 | 6 | 470 | 616 |
| Panhandle (Dist. 10) | 11 | 4 | 7 | 0 | 31,312 | 508 | 676 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 17 | 19 |
| Eastern (Dist. 5 & 6) | 15 | 5 | 1 | 9 | 77,283 | 876 | 847 | 0 | 0 | 0 | 6 | 6 | 9 | 6 | 0 | 176 | 191 |
| Gulf Coast (Dist. 2 & 3) | 31 | 24 | 0 | 7 | 202,330 | 1,661 | 1,678 | 4 | 1 | 0 | 4 | 9 | 71 | 16 | 43 | 343 | 473 |
| Southwest (Dist. 1 & 4) | 34 | 17 | 0 | [1]17 | 136,367 | 1,694 | 1,545 | 0 | 0 | 0 | 9 | 9 | 65 | 8 | 24 | 422 | 519 |
| Louisiana | 43 | 26 | 3 | 14 | 280,248 | 1,525 | 1,779 | 1 | 0 | 0 | 5 | 6 | 31 | 8 | 6 | 205 | 250 |
| Northern | 25 | 15 | 3 | 7 | 105,034 | 827 | 957 | 1 | 0 | 0 | 3 | 4 | 9 | 0 | 3 | 123 | 135 |
| Southern | 18 | 11 | 0 | 7 | 175,214 | 698 | 822 | 0 | 0 | 0 | 2 | 2 | 22 | 8 | 3 | 82 | 115 |
| Arkansas | 7 | 4 | 0 | 3 | 21,343 | 289 | 302 | 0 | 0 | 0 | 2 | 2 | 11 | 0 | 3 | 60 | 74 |
| Mississippi | 13 | 4 | 0 | 9 | 96,264 | 251 | 234 | 1 | 0 | 0 | 6 | 7 | 12 | 3 | 0 | 98 | 113 |
| Southeastern States | 3 | 1 | 0 | 2 | 12,927 | 39 | 46 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 16 | 16 |
| Montana | 16 | 9 | 0 | 7 | 43,588 | 161 | 185 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 35 | 35 |
| Wyoming | 20 | 5 | 0 | 15 | 106,468 | 535 | 417 | 0 | 0 | 0 | 9 | 9 | 7 | 0 | 1 | 83 | 91 |
| Colorado-Utah | 8 | 1 | 0 | 7 | 46,230 | 198 | 59 | 0 | 0 | 0 | 7 | 7 | 7 | 0 | 4 | 96 | 107 |
| New Mexico | 20 | 7 | 11 | 2 | 119,713 | 470 | 448 | 0 | 0 | 0 | 3 | 3 | 15 | 0 | 7 | 53 | 75 |
| California | 53 | 41 | 1 | 11 | 197,225 | 1,655 | 1,302 | 2 | 0 | 1 | 10 | 13 | 35 | 0 | 4 | 330 | 369 |
| Miscellaneous (Md.) | 3 | 0 | 0 | 3 | 13,067 | 56 | 37 | 0 | 0 | 0 | 3 | 3 | 1 | 0 | 19 | 20 | 40 |
| Total United States | 920 | 466 | 71 | 383 | 3,628,968 | 31,383 | 30,839 | 29 | 2 | 3 | 187 | 221 | 1,082 | 57 | 183 | 5,753 | 7,075 |
| Total previous week | 865 | 450 | 47 | 368 | 3,254,801 | | | 34 | 4 | 3 | 170 | 211 | 1,053 | 55 | 180 | 5,566 | 6,854 |
| Total September 22, 1950 | 934 | 506 | 70 | 358 | 3,205,966 | | | 27 | 3 | 7 | 131 | 168 | 807 | 56 | 151 | 4,598 | 5,612 |

Service wells included: [1]9, [1]5, [1]1



## DAILY AVERAGE PRODUCTION FOR WEEK

| | Sept. 22 crude oil | B. of M. Sept. demand | Sept. 15 crude oil |
|---|---|---|---|
| Alabama | 3,050 | 2,400 | 2,850 |
| Arkansas | 77,050 | 84,000 | 76,350 |
| California | 982,300 | 975,000 | 981,700 |
| Colorado | 77,100 | 77,000 | 77,700 |
| Eastern | 59,200 | 62,000 | 58,000 |
| Florida | 1,675 | 1,600 | 1,675 |
| Illinois | 164,200 | 160,000 | 167,400 |
| Indiana | 31,200 | 29,000 | 30,000 |
| Kansas | 329,750 | 320,000 | 307,450 |
| Kentucky | 31,900 | 29,000 | 31,300 |
| Louisiana | 625,450 | 668,000 | 627,250 |
| North Louisiana | 112,550 | | 114,350 |
| South Louisiana | 512,900 | | 512,900 |
| Michigan | 36,800 | 40,000 | 37,300 |
| Mississippi | 97,800 | 102,000 | 96,800 |
| Montana | 25,000 | 25,000 | 25,100 |
| Nebraska | 6,400 | 8,000 | 6,150 |
| New Mexico | 145,575 | 154,000 | 145,575 |
| Oklahoma | 505,700 | 530,000 | 506,600 |
| Texas | 2,827,600 | 2,690,000 | 2,827,600 |
| Dist. 1 (Southwest) | 33,575 | | 33,575 |
| Dist. 4 (Southwest) | 259,450 | | 259,450 |
| Dist. 2 (Gulf Coast) | 166,475 | | 166,475 |
| Dist. 3 (Gulf Coast) | 486,675 | | 486,675 |
| Dist. 5 (Eastern) | 57,100 | | 57,100 |
| Dist. 6 (Eastern) | 117,950 | | 117,950 |
| East Texas field | 277,200 | | 277,200 |
| Dist. 7-C (West) | 108,350 | | 108,350 |
| Dist. 8 (West) | 992,925 | | 992,925 |
| Dist. 7-B (W. Central) | 83,600 | | 83,600 |
| Dist. 9 (N. Central) | 159,550 | | 159,550 |
| Dist. 10 (Panhandle) | 84,750 | | 84,750 |
| Utah | 3,800 | 5,000 | 3,600 |
| Wyoming | 190,900 | 178,000 | 190,100 |
| Total United States | *6,222,450 | 6,140,000 | 6,200,500 |
| Change from previous week, up | 21,950 | | |
| Canada | 181,525 | | 174,890 |

Total U. S. production January 1-September 22 †1,613,272,885 bbl.
Same period last year (crude plus cond.) 1,394,847,240 bbl.

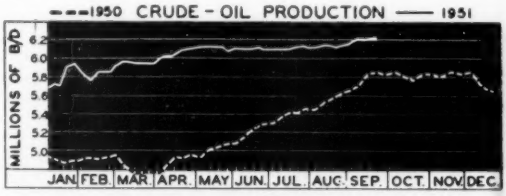
*Not including 102,905 bbl. condensate. †Including 27,829,795 bbl. condensate.

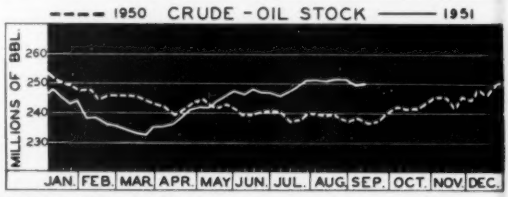
## CRUDE-OIL STOCKS BY STATES OF ORIGIN*

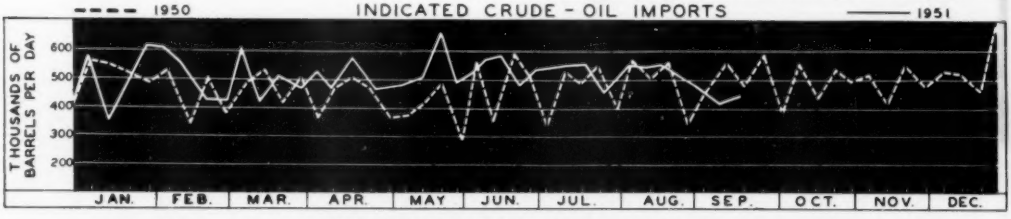
(Thousands of barrels)

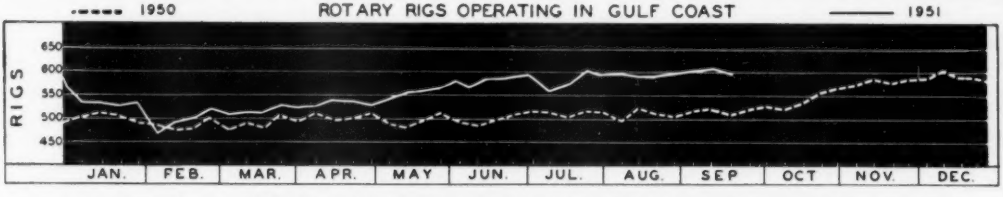
| | Sept. 15, 1951 | Sept. 8, 1951 | Sept. 16, 1950 |
|---|---|---|---|
| Pennsylvania Grade | 2,167 | 2,142 | 2,463 |
| Other Appalachian | 1,561 | 1,511 | 1,423 |
| Illinois, Indiana, Michigan | 12,388 | 10,995 | 9,783 |
| Arkansas | 2,713 | 2,751 | 2,909 |
| Louisiana | 14,633 | 14,324 | 14,302 |
| North | 2,685 | 2,725 | 3,153 |
| Gulf | 11,948 | 11,599 | 11,149 |
| Mississippi | 3,251 | 2,848 | 2,470 |
| New Mexico | 6,572 | 6,602 | 6,258 |
| Oklahoma and Kansas | 38,342 | 38,730 | 34,362 |
| Texas | 118,760 | 119,595 | 115,697 |
| East Texas | 14,792 | 14,708 | 13,689 |
| West Texas | 50,299 | 50,003 | 45,448 |
| Texas Gulf | 26,342 | 26,786 | 28,430 |
| Other Texas | 27,327 | 28,098 | 28,130 |
| Rocky Mountain | 13,110 | 13,082 | 10,459 |
| California | 30,050 | 29,789 | 30,987 |
| Foreign | 6,943 | 7,434 | 6,042 |
| Total | 250,490 | 249,803 | 237,155 |

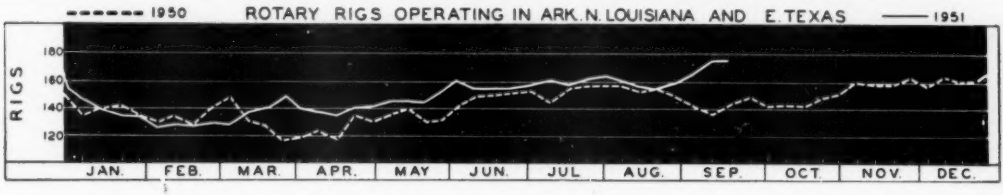
*Bureau of Mines.



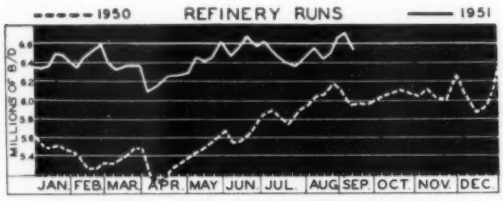


1950 ROTARY RIGS OPERATING IN ARK. N. LOUISIANA AND E. TEXAS 1951
RIGS
180
160
140
120
JAN. FEB. MAR. APR. MAY JUN. JUL AUG. SEP. OCT NOV. DEC.

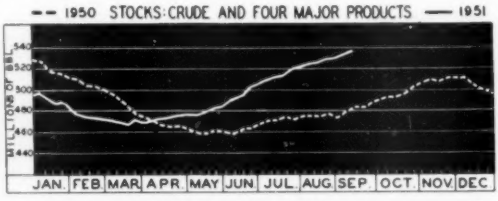
## A.P.I. REFINERY REPORT, SEPTEMBER 15

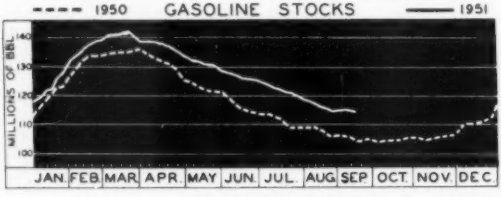
(Thousands of barrels)

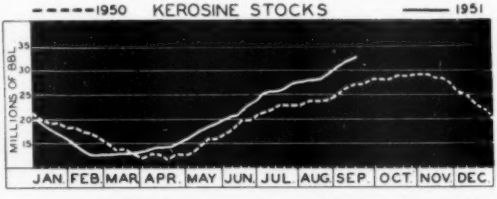
| District | Daily avg. crude runs | Daily average production | | | | Stocks at refineries, bulk terminals, in transit and in pipe lines | | | | Bureau of Mines, September 1950 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Gasoline* | Kerosine | Distillate | Residual | Gasoline† | Kerosine | Distillate | Residual | Daily avg. crude runs | Gasoline* | Kerosine | Distillate | Residual |
| East Coast | 1,047 | 420.1 | 39.6 | 250.6 | 226.0 | 24,931 | 12,046 | 30,994 | 11,979 | 983 | 386.5 | 43.9 | 219.2 | 219.8 |
| Appalachian: | | | | | | | | | | | | | | |
| District 1 | 95 | 45.0 | 3.6 | 14.3 | 6.9 | 2,703 | 603 | 1,072 | 619 | 105 | 46.2 | 6.3 | 11.9 | 10.1 |
| District 2 | 73 | 35.3 | 4.6 | 13.6 | 18.3 | 1,573 | 302 | 432 | 292 | 73 | 35.5 | 4.8 | 8.4 | 14.6 |
| Ind., Ill., Ky. | 1,177 | 631.4 | 70.4 | 188.6 | 151.7 | 24,818 | 7,445 | 20,489 | 5,884 | 993 | 512.7 | 59.7 | 166.4 | 141.5 |
| Okla., Kans., Mo. | 524 | 301.1 | 14.1 | 125.0 | 62.1 | 12,048 | 1,933 | 11,027 | 1,937 | 510 | 287.4 | 17.3 | 119.1 | 55.5 |
| Inland Texas | 261 | 168.3 | 15.8 | 42.4 | 41.3 | 3,833 | 602 | 1,698 | 1,192 | 212 | 149.2 | 10.5 | 32.1 | 34.6 |
| Texas Gulf Coast | 1,569 | 737.6 | 130.3 | 324.3 | 253.1 | 17,492 | 5,524 | 10,755 | 6,552 | 1,473 | 664.8 | 111.3 | 322.0 | 259.0 |
| La. Gulf Coast | 519 | 238.9 | 59.8 | 125.1 | 50.6 | 5,961 | 2,865 | 4,007 | 2,222 | 496 | 237.1 | 56.7 | 115.2 | 62.9 |
| N. La. and Ark. | 74 | 33.6 | 5.9 | 14.3 | 6.0 | 2,879 | 594 | 994 | 182 | 78 | 28.2 | 8.2 | 17.4 | 8.8 |
| Rocky Mountain: | | | | | | | | | | | | | | |
| New Mexico | 11 | 5.6 | | 2.0 | 3.1 | 113 | | 61 | 33 | 13 | 7.0 | .4 | 2.2 | 3.2 |
| Other Rocky Mtn. | 229 | 103.6 | 8.6 | 38.7 | 43.3 | 3,768 | 426 | 2,146 | 1,145 | 195 | 87.5 | 4.9 | 37.4 | 34.4 |
| California | 965 | 382.4 | 12.7 | 123.0 | 365.9 | 14,199 | 605 | 8,853 | 15,935 | 928 | 406.5 | 9.0 | 128.4 | 333.7 |
| September 15, 1951 | 6,544 | 3,102.9 | 365.4 | 1,261.9 | 1,228.3 | 114,318 | 32,945 | 92,528 | 47,972 | 6,059 | 2,848.6 | 333.0 | 1,179.7 | 1,178.1 |
| September 8, 1951 | 6,705 | 3,162.3 | 374.3 | 1,247.4 | 1,266.4 | 114,871 | 31,980 | 90,430 | 48,328 | | | | | |
| September 16, 1950 | 5,983 | 2,804.0 | 310.7 | 1,187.7 | 1,165.7 | 104,305 | 26,577 | 74,136 | 42,208 | | | | | |

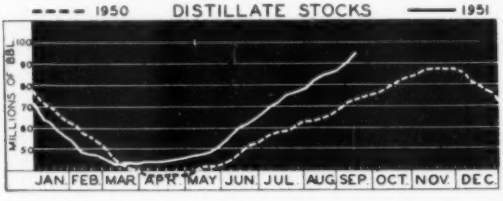
*At refineries including natural blended. †Finished and unfinished.

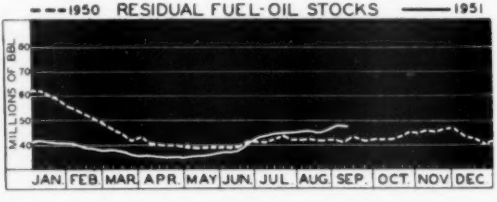


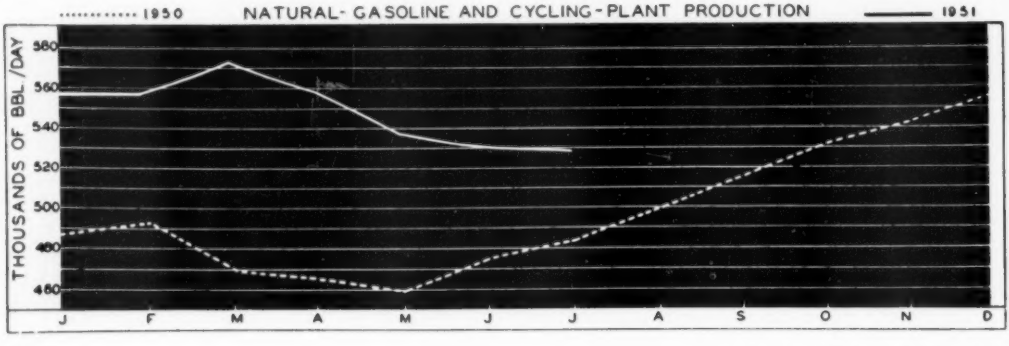



## CRUDE PRICES GRAVITY SCHEDULE

| | Signal Hill, Calif.‡ | Oklahoma, Kansas | Gulf Coast Tex.* | West Tex.† |
|---|---|---|---|---|
| 18-18.9 | $1.93 | .... | .... | .... |
| 19-19.9 | 1.98 | .... | .... | .... |
| 20-20.9 | 2.03 | $2.25 | .... | $2.12 |
| 21-21.9 | 2.07 | 2.27 | .... | 2.14 |
| 22-22.9 | 2.12 | 2.29 | .... | 2.16 |
| 23-23.9 | 2.18 | 2.31 | .... | 2.18 |
| 24-24.9 | 2.24 | 2.33 | $2.56 | 2.20 |
| 25-25.9 | 2.30 | 2.35 | 2.58 | 2.22 |
| 26-26.9 | 2.36 | 2.37 | 2.60 | 2.24 |
| 27-27.9 | 2.41 | 2.39 | 2.62 | 2.26 |
| 28-28.9 | 2.46 | 2.41 | 2.64 | 2.28 |
| 29-29.9 | 2.52 | 2.43 | 2.66 | 2.30 |
| 30-30.9 | 2.57 | 2.45 | 2.68 | 2.32 |
| 31-31.9 | 2.62 | 2.47 | 2.70 | 2.34 |
| 32-32.9 | 2.68 | 2.49 | 2.72 | 2.36 |
| 33-33.9 | .... | 2.51 | 2.74 | 2.38 |
| 34-34.9 | .... | 2.53 | 2.76 | 2.40 |
| 35-35.9 | .... | 2.55 | 2.78 | 2.42 |
| 36-36.9 | .... | 2.57 | 2.80 | 2.44 |
| 37-37.9 | .... | 2.59 | 2.82 | 2.46 |
| 38-38.9 | .... | 2.61 | 2.84 | 2.48 |
| 39-39.9 | .... | 2.63 | 2.86 | 2.50 |
| 40 and above | .... | 2.65 | 2.88 | 2.52 |

*For crude from Daboval, El Campo, and sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6 1947.

‡Standard Oil Co. of California.

## FLAT CRUDE PRICES

Representative posted schedules per barrel.

| | |
|---|---|
| East Texas† | $2.65 |
| Kettleman Hills, California* | 2.80 |
| Beauregard Parish | 2.60 |
| Illinois Basin | 2.77 |
| Pecos County, Texas (Yates) | 2.35 |
| Bradford, Pennsylvania | 4.25 |
| Eastern Ill. and Western Ind.† | 2.77 |
| Tomball, Texas Gulf Coast | 2.83 |

*37°-37.9°. †35° and above.

CURRENT statistics indicate that East Coast suppliers have been doing a good job of moving distillate fuel into consumer and reseller storage during the summer months. Also, they have filled all primary storage in the high-demand areas of the northeastern states.

Indicated refinery demand for distillate fuels from Districts 1 and 3 for the 4-week period ended September 15 was about 25 per cent greater than for the same weeks last year. The volumetric increase was about 3,500,000 bbl. Since reports of purchases of distillate fuel for customers normally supplied from the Abadan refinery indicate that extra shipments of distillate amounted to something less than 2,000,000 bbl. for the period, sales to domestic customers were up more than 12 per cent. This compares with an indicated gain of less than 5 per cent for District 2 which is not influenced to any great extent by recent increases in export sales. Most marketers agree that the continuing high volume of distillate sales on the East Coast has filled most consumer and reseller storage.

In addition to large-scale movement to consumer storage in District 1, most of the gain in primary distillate inventories for Districts 1 and 3 combined has been on the East Coast. Distillate stocks in Districts 1 and 3 on September 15 were 10,023,000 bbl. greater than on same date last year. District 1 accounted for 9,856,000 bbl. of this total.

The possibility of higher price ceilings for distillate sold on the East Coast this winter has been a major factor in the program of building inventories near points of consumption. Without such an increase, prices will be further out of balance when greater shipping demands bring higher spot tanker rates during the coming winter months.

## REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of September 24, 1951. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

### GASOLINE, KEROSINE, AND FUEL OILS

| | Mid-Continent Group 3 | New York Harbor (barge) | Texas Gulf Coast |
|---|---|---|---|
| Regular gasoline, 80-82 octane | 10¼-10½ | 12-12.75 | 10¾-11 |
| Premium gasoline, 86-88 octane | 11¼-11½ | 13.5-13.75 | 11¾-12 |
| 42-44 w.w. kerosine | 9-9⅜ | 10 | 9 |
| No. 2 straw fuel oil | 8-8⅛ | 9 | 8 |
| No. 6 residual | $1.70-1.80 | $2.45-2.60 | $1.75-1.90 |

### NATURAL GASOLINE

| | Group 3 | North Texas | N. La. |
|---|---|---|---|
| Grade 26-70 | 6⅜ | 5⅞ | 6¼ |
| Grade 18-55 | 7.65 | 7.15 | 7.40 |

### LUBRICATING OILS

South Texas

| | |
|---|---|
| 200 vis., No. 2-3 neutral | 13-13.5 |
| 750 vis., No. 3-4 neutral | 16 |
| 2,000 No. 5-6 neutral | 18-19 |

### LUBRICATING OILS

Mid-Continent

| | |
|---|---|
| 150-160 vis., D bright stock, 0-10 pp. | 20-30 |
| 200 vis., No. 3 neutral, 0-10 pp. | 17.5-18.5 |

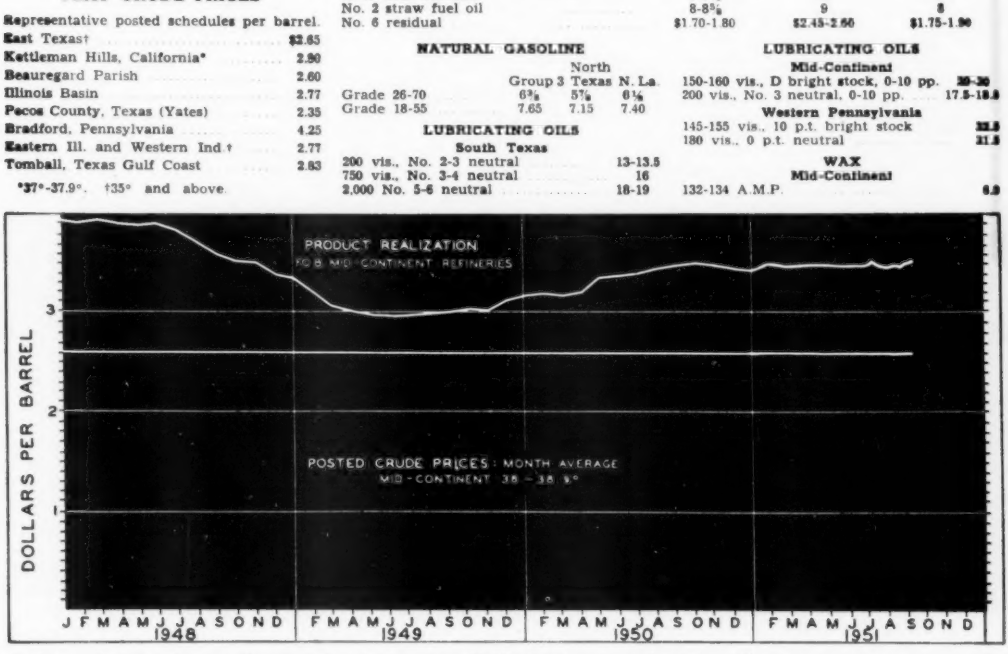
Western Pennsylvania

| | |
|---|---|
| 145-155 vis., 10 p.t. bright stock | 33.5 |
| 180 vis., 0 p.t. neutral | 31.5 |

### WAX

Mid-Continent

| | |
|---|---|
| 132-134 A.M.P. | 6.0 |


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 – 38.9°
DOLLARS PER BARREL
3
2
1
J F M A M J J A S O N D
1948
F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951

*In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.54 for week ended September 15, $3.53 for previous week, and $3.51 for September 1950.*

# EQUIPMENT MEN . . . in the News

## Williamson Appoints Panhandle Representative

J. S. KONE

The appointment of James S. Kone & Co., Amarillo, as sales representative for West Texas, the panhandles of Oklahoma, Texas, and southwestern Kansas, has been announced by T. D. Williamson, Inc., Tulsa, manufacturers of pipe-line tools and equipment.

Kone, who was associated with Manning, Maxwell & Moore for 7 years, also represents Joseph A. Coy Co., Santa Fe Tank & Tower Co., Warner Lewis Co., Coppus Engineering Corp., Daniel Orifice Fitting Co., and F. H. Maloney Co.

Williamson, Inc., has also announced the appointment of two new service engineers, James H. McBrien and Floyd E. Zongker. Both men are experienced in corrosion surveys and the installation of corrosion-control equipment as well as inspection of pipe-line construction. They have been associated with Huddleston Engineering Co., Bartlesville, Okla., and in recent years with major pipe-line companies of the Mid-Continent.

## Aeroquip Elects Two New Vice Presidents

Peter F. Hurst, president of Aeroquip Corp., Jackson, Mich., recently announced the election, by the board of directors, of two new vice presidents of the company.

Benjamin A. Main, Jr., vice president in charge of engineering, has been with Aeroquip since 1942 as chief development engineer. H. L. Schrock, Jr., vice president and treasurer, has been with the company since 1947, and was formerly associated with Ernst & Ernst, certified public accountants.

## Torrey, Cushman Form New Chemical Products Firm

Paul D. Torrey, registered petroleum engineer, and Allerton Cushman have formed a general partnership known as Oil Recovery Chemicals with offices and laboratory in Austin, Tex.

Oil Recovery Chemicals is the exclusive representative of Armour & Co., Chicago, for the sale and application of surface-active compounds and other chemical products used in the production of oil and gas and for other related operations of the petroleum industry in the states of Arkansas, Louisiana, New Mexico, Oklahoma, and Texas. They also represent Oil Recovery Corp., New York, for the application of its Orco process (carbonic acid process) to certain reservoirs to increase oil recovery.

## Green Named to Sales Staff of Indian Drilling

The Indian Drilling Mud Co. recently announced the appointment of Taylor C. Green as sales engineer in the Tulsa area. Taylor is a graduate in petroleum engineering from the University of Oklahoma.

Taylor's oil-field experience includes 1 year on a barge drilling in the Gulf Coast for Salt-Dome Oil Corp., a tour of duty with Black, Sivalls & Bryson, and 6 months on his own as a drilling contractor.

## Natchez Store Opened By Mid-Continent

Ken W. Davis, president of Mid-Continent Supply Co., Fort Worth, has announced the opening of the company's newest field supply store at Natchez, Miss. This store is the latest addition to the Mid-Continent chain of branch stores servicing the areas of Texas, Louisiana, Oklahoma, Arkansas, Mississippi, Kansas, New Mexico, Colorado, and Wyoming.

The Natchez store is under the direction of Store Manager F. A. Burge, and is under the supervision of Divisional Manager C. M. Fleeman, Shreveport.

G. H. Canterbury and A. M. Thompson are field salesmen, and R. H. Wallace, Isaac Foster, and J. B. Timmons are store men.

## P.E.P.A. Meets

The twenty-third annual meeting of the Petroleum Electric Power Association will be held November 19-20 at the Shamrock Hotel in Houston.

P.E.P.A. is an organization of electric-power companies formed for the purpose of rendering greater service, through cooperative effort, to the petroleum industry.

*(Continued on page 164)*

## Moorlane Opens New Branch Office and Warehouse

*New Moorlane Co. branch office and warehouse which has 11,000 sq. ft. of floor space and equipped with a modern warehouse, storage, and handling equipment.*

The opening of a new branch office and warehouse for Moorlane Co. at Denver has been announced by W. D. Moorer, president. Moorlane is a major distributor of industrial supplies, pipe, valves, fittings, and piping specialties in the Mid-Continent and mountain areas.

D. M. Huffman is manager of the Denver branch and a director of the company.

The new branch will open for business September 29, and will be visited by W. D. Moorer, president; E. L. Hagar, executive vice president and manager of the Tulsa branch; L. P. Fagan, secretary; and H. S. Medlin, treasurer. Others in attendance will be H. E. Boggs, vice president and manager of the Amarillo branch; B. A. Mead, manager of the Oklahoma City branch; and Rex Bircket, a director of the company. In addition to company officials and directors, a number of officers and sales representatives of companies represented by Moorlane will visit the plant.

The new building will also house the offices of the Braden Steel Corp., a subsidiary of Moorlane Co.

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY...

# CLASSIFIED ADVERTISING

**DISPLAY CLASSIFIED**
**$12.00 a column inch one issue . . .**
**10% Discount three or more issues.**

**UNDISPLAYED CLASSIFIED 12c a word one issue. 10% Discount three or more issues. $3.00 minimum charge. Blind Box in our care counts nine words. Payable in Advance.**

## EQUIPMENT FOR SALE

**502 FEET** 10-inch **seamless casing**, like new, 40 pound, 8 V threads. Near Tulsa. **1208 E. 20th St., Tulsa. Phone 3-9232.**

**FOR SALE: 2 Sullivan 37 Special rigs mounted on International trucks, Waukesha and Buda drill motors. 1700 ft. Sullivan 2⅝ tool joint drill pipe 20 ft. one 800 gallon water tank mounted on late model Chevrolet truck. Two four wheel rod trailers, two 200 gallon gasoline trailers. Equipment in top shape, used less than two years. Nothing additional needed to start drilling. Will sell any part separately except drill pipe. TRANS-TEX EXPLORATION CO., Box 558, Abilene, Texas. Phones 2-7565—4-8130.**

USED steel derricks, erected one time. Good condition. 80, 87, 94, and 122 ft. steel angle iron. 80 ft. steel tubular. All heavy. Now erected. Sell as is, dismantled or erected your location. Bolted steel tanks. One 200 bbl. wood gun bbl. 3 x 15 ft., 500# vessel, one 2½ x 10 ft. std. separator complete. All items good condition. Box 4242, Oklahoma City 9.

**160,000 feet 1" O.D.**
**New Electric Weld Steel Tubing**

18 ga. Wall
20 foot lengths
Flood Damaged Stock
At a drastic reduction in price
Immediate Delivery
Subject to Prior Sale

**Write — Wire — Phone**

**SONKEN-GALAMBA CORP.**
**2nd and Riverview (X-734)**
**Kansas City 18, Kansas**
**THatcher 9243**

**FOR SALE**

**10,000 FEET 4" O.D. x .054" WALL SEAMLESS ALUMINUM TUBING**

Spec. Alcoa 63 St 6—40 ft. Lengths

Working Pressure to 250 P.S.I.

Excellent for irrigation line, water service, etc.

Complete with galvanized 4 bolt Dresser Heavy duty couplings

**ALL USED ONLY FEW MONTHS—CONDITION PERFECT**

Prompt Shipment subject to prior sale. Price including couplings—51c foot

F.O.B. White Haven, Pa.

**L. B. FOSTER COMPANY**
**New York City—Pittsburgh—Chicago Houston**

## EQUIPMENT FOR SALE

**USED ROTARY AND CABLE TOOL DRILLING TOOLS, WIRE LINES, E. A. KELLY, BOX 861, OKLAHOMA CITY. PHONE 5-6407.**

**FOR SALE: Seamless casing and tubing new and second hand. Phone Rogers Pipe and Supply Co., Tulsa, Okla.**

**FOR SALE: One super model Wilson single drum servicing unit, 80 hp. Waukesha, 1,000' wire, all tubing tools, mounted on GM 4-wheel drive truck. $3500. Phone Rogers Pipe and Supply Co., Tulsa, Okla.**

**Complete Drilling Rig**
**FOR SALE**

Unit rig model 15, two strings of drill pipe, Jack Knife derrick, etc., excellent condition. For further information write

**PREMIER WELL SERVICE, INC.**
**840 Esperson Bldg., Houston, Tex.**

**NO. 1 USED SEAMLESS CASING**

Approximately 75,000' 5½" o.d., 14 lb., 15.5 lb. and 17 lb., 8 round range 2.

**A.P.I. NEW & USED TUBING**

Approximately 30,000' 3½" o.d., 9.20 lb. A.P.I. 10 round, range 2, regular tubing used.

Approximately 13,000' 2⅞" o.d., 6.40 lb., A.P.I. 10 round, range 2, regular Tubing new.

**FRANK MORRIS & CO.**
**424 So. Cheyenne Tulsa, Oklahoma**
**Phone 2-6248**

## EQUIPMENT FOR SALE

FOR SALE: Gas distributing system including main, gathering and distributing line, meter regulators; also franchise covering about 30 miles of territory paying approximately $2,400 a year, now can be built to $10,000 with about 4 miles more line. Reason for selling, age and health 119 Olive Street, Leavenworth, Kansas Phone 692-W.

**FOR SALE:**
**USED ELECTRIC POWER PLANT**

2 Type G.A.W. Cooper-Bessemer Engines size 12½ x 15; 150 HP. Serial 40673 & 40674.

2 AC Generators 125 KW, 48 volt, 3 phase, 60 cycle, 900 rpm. Allis-Chalmers. Serial 91210 K 51 DE 21-1 & 2.

Plant complete with coolers, exciters, water pumps, tanks, switch boards and a 32 ft. by 36 ft. house, studding covered by corregated metal siding.
Cost $31,000—priced at $15,000.

Located on Summit Oil & Nat'l. Gas Corp. Kagy Lease in Tonti Pool, 1½ miles Northwest of Salem, Ill. Can be inspected without appointment.

**Inquire Wm. Peters, on lease, Box 239, Salem, Ill., or L. A. Mylius, Box 264, Centralia, Ill.**

**BUY NOW FOR IMMEDIATE DELIVERY!**
**EXCELLENT GAS OR FLOW LINE PIPE!**

**ONCE USED SEAMLESS TUBING—HYDROSTATICALLY TESTED TO 1,000± P.S.I., THOROUGHLY RECONDITIONED, ENDS CUT READY FOR WELDING, GOOD AS NEW FOR ALL PURPOSES:**

| | | | | |
|---|---|---|---|---|
| 136,000' | 1¼" O.D. x | .135" Wall | 1.62± | 14' Lengths and Over. |
| 50,000' | 2" O.D. x | .140" Wall | 2.70± | 14' Lengths and Over. |
| 100,000' | 2¼" O.D. x | .120" Wall | 3.20± | 14' Lengths and Over. |
| 20,000' | 3" O.D. x | .150" Wall | 4.06± | 14' Lengths and Over. |
| 20,000' | 3¼" O.D. x | .135" Wall | 4.49± | 14' Lengths and Over. |
| 50,000' | 3½" O.D. x | .135" Wall | 4.85± | 14' Lengths and Over. |
| 80,000' | 4" O.D. x | .150" Wall | 6.17± | 14' Lengths and Over. |

**UNUSED STEEL TUBING, PLAIN ENDS:**

| | | | | |
|---|---|---|---|---|
| 40,000' | 3" O.D. x | .200 .270" | Wall SMLS. | 7.3± 18'-30' Lengths. |
| 60,000' | 3" O.D. x | .270 .350" | Wall SMLS. | 8.9± 20'-40' Lengths. |
| 75,000' | 4" O.D. x | .165" | Wall ELECTRIC WELD | 15'-22' Lengths. |

OTHER SIZES NEW AND USED CASING, TUBING, LINE PIPE & SEAMLESS TUBING

FOR COMPLETE DETAILS AND PRICES, PHONE OR WIRE COLLECT

**A. J. STRUBEL, Broker**

**SIDney 1791 (Day Phone) HUDson 8152 (Night Phone) 4946 Murdoch, St. Louis, Mo.**

## EQUIPMENT FOR SALE

**PIPE**

**ALL SIZES; LINE PIPE AND CASING, TANKS, AND OILFIELD SUPPLIES. EDCO PIPE & SUPPLY CO., PHONES 933 OR 1286, DRUMRIGHT, OKLA.**

FOR SALE: Fred E. Cooper-Allis-Chalmers Model W Double Drum Skid Well Servicing Machine. First-class condition, equipped with Drum Dividers, Starting Equipment and Mast Frames but no Mast. Write or call Buckeye Supply Company, Zanesville, Ohio.

SPUDDERS, BUCYRUS, Wichita, Fort Worth, also rotaries and core drills. Good used equipment, tools, pipe, cable. Everything for well drilling. Fishing tools rented. Pressey & Son, Pueblo, Colorado.

### FOR SALE

**10 x 15 Connersville Meter #12762—55000 cu. ft. per hour rating—125 psig. W P. Equipped with Foxboro PVTT Gauge. Factory reconditioned. Proof curve available. Located our Bluffton, Indiana, Warehouse.**

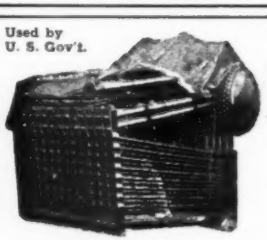
**Phone or Write**

**L. A. MUSSMAN**

**PANHANDLE EASTERN PIPE LINE COMPANY**

**1221 Baltimore**
**Kansas City 6, Missouri**
**Phone Baltimore 3700**

**Used by U. S. Gov't.**



**3 EA. BOILERS—ASME—3604HS**
**24,800-33,080# Steam per Hour EACH CROSS DRUM STEEL SEC. HEADER 350 psi.—with integral furnace for economical installation—11.7-12.8 lbs. steam per pound fuel oil**

**INSPECTION GUARANTEED**

**Built for 200% rating—Triple riveted 60,000# T.S. Steel Built by Hedges-Walsh-Weidner for Oil or Gas Firing No dismantling—move intact.**

**$8,500 ea.—Loaded Car**

**1 ea. 90-110,000 lb. hr. C-E NEW boiler, 310# WP, never installed or used. With oil burners. Price: $25,000—Saving of 60%**

**UNITED STEEL PROD. CO.**
**Box 4111 Memphis, Tenn. Ph. 8-8509**
—Dealers Protected—

## EQUIPMENT FOR SALE

ONE MUSKOGEE heavy duty single drum, rod, tubing and bailing unit. Skid mounted. A-1 condition. Harry Mach, Phone 62-6143 or 9-4746, Oklahoma City, Oklahoma.

BETHLEHEM 50 draw works with 145 G.K.U. engine and torque converter, 94 foot mast with substructure C-150 pump and engine, rotary, swivel and 3,550 foot 3½ inch drill pipe, complete rig now working, $25,000. Model E.C. Cardwell draw works with 2 W.A.K.U. engines, 94 foot Lee C. Moore mast with 6 foot substructure, 60 ton swivel and set B. J. Wilson tongs. Rig now working. Lot $32,500. All the above material located in Central Texas. Norvell-Wilder Supply Company, Box 2178, Houston, Texas. At-3471.

**FOR SALE: 2—18' x 30' Braden Sectional Steel Corrugated Iron Buildings erected in Seminole Field, $450 each. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.**

### FOR SALE

Model M Wichita Spudder (2000 ft.), with Waukesha motor and complete tools, lines, winch, truck and Caterpillar tractor.

**P.O. BOX 1098, or PHONE 1432**
**Shawnee, Okla.**

### PIPE THREADING MACHINES

3—#8 Oster Rapiduction, 2½" to 8", 1942
2—6" Landis, 2½" to 6", Late
1—8" Landis, M/D, Late
1—2" Landis, Late
1—#316 Oster, 1¼" to 6"
1—#304 Oster, 1" to 4"

**O'Brien Machinery Co.**
**Div. A. 1545 N. Delaware Avenue**
**Philadelphia 25, Pa. GArfield 6-1150**

### 25,000 feet NEW SEAMLESS TUBING

4" O.D. — 12 gauge wall
Asphalt coated
40 foot lengths

**Write — Wire — Phone**

**SONKEN-GALAMBA CORP.**
**2nd and Riverview (X-767)**
**Kansas City 18, Kansas**
**THatcher 9243**

## CASING—TUBING—LINE-PIPE

15,000' of 4½" OD, R-2, used SS drill pipe casing, new 8 rd. thrds., and new J-55 regular casing couplings, hydrostatically tested 2500#.

2,000' of 5½" OD, 14#, 10V thrd., R-2, used SS casing.

5,000' of 2⅜" OD, 4.60#, 11½ V thrd., 25' lengths, regular used SS tubing.

5,000' of 2⅜" OD, 4.70#, 10 V thrd., EUE, R-2, used SS tubing.

4,100' of 2⅞" OD, 6.50#, 8 rd. thrd., EUE, R-2, used SS tubing.

100,000' of 4½" OD, 0.188" wall, DRL, 1800# test, PE, new electric weld line pipe.

5,000' of 2⅞" OD, PE or T&C, R-1, used SS tubing.

**BROWN PIPE & MACHINERY COMPANY**
**P. O. Box 2368, Phone 3-9391, Corpus Christi, Texas**

## EQUIPMENT FOR SALE

## OIL REFINERY EQUIPMENT

***We have purchased oil refinery equipment from Cities Service Oil Company at East Braintree, Mass. To be sold for use, before demolition is started, as follows:***

**A:** One group of three shell stills 10'x40' each on brick foundations approx. 8' high with common brick chimney 5'x50'.

**B:** One group of two shell stills 10'x40' each on brick foundations approx. 8' high with common brick chimney 5'x50'.

**C:** One group of two shell stills 10'x40' each on brick foundations approx. 8' high with common brick chimney 5'x50'.

**D:** One group of two shell stills 10'x40' each on brick foundations approx. 8' high with common brick chimney 5'x50'.

**E:** One group of two shell stills 10'x40' each on brick foundations approx. 8' high with common brick chimney 5'x50'.

**F: ONE BADGER ATMOSPHERIC UNIT —CONSISTING OF:**
1 Pipe still heater—steel & brick with tube supports, tubes and return bends.
1 Primary Tower 5'-6"x67'-6" with 17 internal trays.
1 Secondary Tower 8'x67'-6" with 9 internal trays.
1 Kerosene Stripper 3'x16'-10" with 4 internal trays.
1 Fuel Oil Stripper 3'x31'-7" with 8 internal trays.
2 Water Separators 3'x9'.
20 Exchangers, Coolers, Condensers various sizes, Copper Tubing & Coils.

**G: ONE BADGER ATMOSPHERIC UNIT —CONSISTING OF:**
1 Pipe still heater—steel and brick with tube supports, tubes and return bends.
1 Primary Tower 10'-6"x67'-10" with 30 internal trays.
1 Kerosene Stripper, 2'-6"x12'-0" with 4 internal trays.
1 Fuel Oil Stripper 2'-6"x12'-0" with 4 internal trays.
1 Water Separator 3'-0"x9'-0".
20 Exchangers, Coolers, Condensers, Various Sizes, Copper Tubing and Coils.

**H: EQUIPMENT COMMON TO BOTH ATMOSPHERIC UNITS:**
1 Brick Stack 5'-6"x100'.
1 lot structural steel, approx. 250 tons, supports, channels, H beams.
1 Pump House, concrete floor and foundation, brick walls, transite roof, 16'-2"x102'-0"x12'.
1 lot pipe, approx. 25,000', 4", 6", 8"; valves and fittings.
1 lot control equipment.

**I: RUNDOWN TANKAGE:**
19 2500 BARREL RUNDOWN TANKS 30x20'.
1 lot pipe, approx. 20,000', 6", 8", 10", 12"; valves and fittings.
1 lot overhead pipe supports, approx. 100 tons.

**J: RECEIVING HOUSE ATMOSPHERIC UNIT:**
1 lot cast iron plug valves and piping, approx. 250 tons.

***Railroad siding and equipment for loading on cars or barges available. Representative on premises.***

**EX-U. S. NAVY COASTAL TANKER YW-94**

**Constructed 1944—**
**Western Pipe & Steel Co.**

• CARGO CAPACITY—6550 BBLS.—DIESEL DRIVEN • LENGTH 174'—BEAM 32'-10" • DEPTH—Fore 12'-4"—Aft 13'-9" • MAIN ENGINE—UNION DIESEL 560 H.P.—325 R.P.M. 4 Cycle—Direct Reversible—Single Screw • 2 WATEROUS Rotary Cargo Pumps, 600 G.P.M. • SPERRY Gyro. Steering Engine—Auxiliary Diesel Generators—Windlass—Navigating Equipment, etc.

**PRICE $75,000 AS IS**
**Ex location San Pedro, Calif.**

**J. C. BERKWIT & CO.**
**551 FIFTH AVE., NEW YORK 17, N. Y.**
**MUrray Hill 2-2214**

## EQUIPMENT FOR SALE

**FOR SALE: U-15 rotary rig in first-class condition. Has 3 NKU Waukesha motors with less than 1 year service. Without mast or drill pipe. $80,000.00. Will consider good 4000 ft. rotary as part payment. Box E-286, The Oil and Gas Journal, Tulsa, Okla.**

FOR SALE: 30,000′ of 4½″ API Full Hole and Extra Hole Drill Pipe. Joints measure 5¾″ to 6″ OD. PHIL A. CORNELL & CO., Oklahoma City, Oklahoma.

FOR SALE: Cardwell L draw works with air operated Twin Disc clutches, transmission, GAK Waukesha. Good condition. CLAYPOOL DRILLING COMPANY, St. Elmo, Illinois.

FOR SALE: 3—40 hp. 2 cycle Superior gas engines and 3—OCS countershaft reversible clutches complete with V belts. All in first-class condition. Solar Oil Corporation, 1117 Union National Bank Bldg., Wichita, Kansas.

**FOR SALE: Ideal slush pump, Model C-150. Melton Supply Company, Seminole Oklahoma.**

**3—250 Bbl. National steel welded stock tanks, with walkway and stairs. Write Box 1861, Tulsa, Oklahoma, or Phone 5-3549.**

200 hp. GE Induction Motor, 1,745 r.p.m., 3/60/2200 Model 11-C-50, mounted on factory base, directly connected to 2000 GPM 8″ pump, 230 ft. head. Includes grids, oil switch, starter, etc. $2,000.00. US Prod. Co., Box 4111, Phone 9-6509, Memphis, Tennessee.

FOR SALE: Thompson L-R shale shaker, practically new. Box E-376, The Oil and Gas Journal, Tulsa, Oklahoma.

45 Star heavy duty spudder, A-1 condition. Two complete strings tools, also fishing tools, one steel dog house 8′ x 12′, water tank. New sand line and drilling line. Phone 1978-M, Sapulpa, Oklahoma.

LE ROI 105 ft. air compressor, little used on '43 GMC 6 x 6. Box E-374, The Oil and Gas Journal, Tulsa, Oklahoma.

ROTARY rig, 3000′, engine drive, Wilson draw works, GD pump, hydraulic mast, complete. Box E-373, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: New seamless drill pipe, 6700′ 3½″ OD 13.30# external upset range 1 & 2 Seal Grip and Shrink Grip threads; 2500′ 4½″ OD 16.60# internal upset range 1 Shrink Grip threads. Box E-380, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE erected in Chase, Kansas, area: Two American Steel API Angle Iron Derricks with crown blocks, 333,000# Capacity. Cities Service Oil Company—Patridge, Bartlesville, Oklahoma.

**FOR SALE: One Bucyrus-Erie 36 L Spudder three and one-half years old. Complete top to bottom tools 15½ to 5½. Also complete tailing in tools. All in first-class condition. List on request. J. E. Griggs, 310 East Third St., Mt. Carmel, Illinois. Phone 959.**

PIPE LINERS—3800 6″ Short Dresser Couplings w/ Bolts Less Rubbers and 5000—4″ Victaulic Couplings w/ Bolts Less Rubbers All For Sale by Printy Pipe & Supply, Cut Bank, Montana.

FORT WORTH Model-D Spudder, tools for large diameter holes, 2289′ 10¾″ 40.50# P.E. and 925′ 12¾″ 49.56# P.E. all seamless new line pipe. Cash, no trade. Contact Aycock, or Andrews, El Fidel Courts, Espanola, N. M.

**Gaso Duplex 4½″ x 6″ Power Pumps with Chrysler C-36 Engines, skid mounted immediate delivery. Also Byron Jackson, Carter Centrifugal Units Westinghouse 20-25-50 KW Generating Units**

**H. H. COFFIELD**
**Attn.: W. H. ORR**
**Phones: 132—Rockdale, Texas**
**AT-3427—Houston, Texas**

## EQUIPMENT WANTED

WISH TO BUY: Oil field equipment, gasoline engines, pumping units, etc. Tulsa Supply Co., P.O. Box 294, Tulsa, Oklahoma

WANTED—10¾″ or 9⅝″ Regan blowout preventer. State price and location. Folk Drilling Co. Phone 443, 614 Main, Yukon, Okla.

## EQUIPMENT WANTED

WANTED: Complete set of used seismic recording equipment. Must be type generally acceptable to industry in A-1 condition and ready for immediate field operation. Box E-369, The Oil and Gas Journal, Tulsa, Oklahoma.

WE BUY drilling equipment, machines, cable tools, pipe, etc. Turn your surplus equipment into cash. Pressey & Son, Pueblo, Colorado.

**WANTED FOR CASH**

**Electric Motors—Starters, Transformers —Oil & Air Brkrs. Wire—Cable—Wiring Materials.**

**Send Listings**

**ALLIED ELECTRIC & MACHINERY CO.**
**1007 Falls Bldg., P. O. Box 1838**
**MEMPHIS 1, TENN.**

## HELP WANTED

INDUSTRIAL Relations Director for middle west corporation. Must have successful record of handling difficult personnel problems honestly, tactfully. Salary in keeping with high level ability required. Application form and particulars on request. Box E-382, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED IMMEDIATELY: Drilling Contractor for Central Pennsylvania to drill one 8,500-foot Oriskany well and ten shallow 2,000-foot wells. Future very great in these new gas fields. Will back and equip ambitious, competent driller who is a pusher. Contact immediately Winner & Murphy, 218 E. Water St., Lock Haven, Pa.

## HELP WANTED

WANTED: Process Engineer who has had at least five years refinery experience. Box E-367, The Oil and Gas Journal, Tulsa, Okla.

**KEY Seismograph Personnel Needed by Established and Expanding Seismograph Company. Box E-364, The Oil and Gas Journal, Tulsa, Oklahoma.**

EXPLORATION ECONOMIST: Excellent opportunity for qualified applicant. Position requires five to ten years experience in oil industry statistics and economics. Prefer college graduate with concentration in economics and accounting. Must have practical knowledge of exploration problems and be familiar with general activities in the industry. Age thirty to forty. Salary open. All replies held confidential. Box E-341, The Oil and Gas Journal.

**WANTED - ENGINEERS**
**For WORK in TULSA, OKLA.**

Squad Leaders and Draftsmen
Instrumentation
Mechanical Design
Structural
Piping
Electrical
Plant Layout

Contact Chemical Plant Division of

**BLAW-KNOX CONSTRUCTION CO.**
**P.O. Box 1266, Telephone 54-5227**
**Tulsa, Oklahoma**

# OVERSEAS POSITIONS

## An American oil company in South America has positions open for qualified technical personnel.

**Refinery Chemist**—Must have a college degree and a minimum of four years' experience in oil refinery control laboratory. Experience in manufacture of lube oils and greases desirable. Single man preferred.

**Mechanical Engineers**—Engineering degree and minimum of five years' experience in mechanical drafting and design of oil refinery or chemical plant process piping and equipment.

**Electrical Engineers**—Must have E. E. degree and five years' experience in design, operation, and maintenance of electrical installations in oil refineries or chemical plants including generators, motors, motor control, and switch gear.

**Mechanical Foreman**—Must have eight to ten years' experience in maintenance and repair of all types of pumps, compressors, and motors pertaining to oil refinery operations. Will be required to supervise and coordinate the activities of mechanics in installation, maintenance, and repair of this equipment.

**Maintenance Engineers**—Mechanical or Electrical Engineers with a minimum of five years' experience in a modern oil refinery to work in coordination and supervision of maintenance and construction.

**Corrosion Engineers—Degree** and minimum of five years' experience in corrosion engineering. Will be required to make studies and investigations of causes and nature of corrosion pertaining to equipment utilized in oil producing operations.

**Pipeline Engineers—Degree** and four to ten years' experience in design and construction of pipelines, gathering systems, pump stations, tank farms and terminals.

**Drilling Engineers—Degree** and minimum of three years' experience required. Will be required to maintain and analyze records on drilling equipment performance and make recommendations to improve the efficiency of drilling operations.

**Equipment Inspectors**—Graduate Engineers with minimum of four years' experience in refinery inspection required.

**Pipeline Foreman**—Will be required to supervise maintenance and construction of trunk pipeline system.

**Write giving age, education, marital status, and details of previous experience. Your communications will be held in strict confidence.**

**BOX 308-S—RADIO CITY STATION**
**New York 19, New York**

## HELP WANTED

MAN to act as field superintendent for rotary and cable tool rigs. Real opportunity for man who can handle. Position is permanent. Write Box E-371, The Oil and Gas Journal, Tulsa, Oklahoma, giving age, experience, starting salary expected.

CHEMIST with technical background and thoroughly familiar with latest method of analysis of light hydrocarbons. Send complete record of education, experience and minimum salary expected. Box E-381, The Oil and Gas Journal, Tulsa, Oklahoma.

## HELP WANTED

REFINERY ENGINEER: Minimum 3 to 5 years' experience in refinery maintenance, construction and operation, to act as Chief Engineer of substantial Mid-western independent refining company, now undertaking installation of catalytic cracking unit. Write: Box E-375, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Petroleum or Mechanical Engineers for oil tool design. Field experience desirable. State age, education, experience and salary expected. Box E-319, The Oil and Gas Journal, Tulsa, Oklahoma.

## GAS LINE OPERATING PERSONNEL
## CARACAS AND EASTERN VENEZUELA

The Venezuelan Atlantic Transmission Corporation gas line is nearing completion. Urgently need qualified operating personnel for field and Caracas assignments. Family status for Caracas. Single status for the field. Base salary plus living allowance, plus end of year bonus. Eight weeks U. S. vacation every two years. Round trip expenses for employees and, if on married status, for his family. We offer long term assignments for engineers, foremen, and craftsmen qualified in these natural gas operations:

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GAS LINE WELDING
TRACTOR OPERATION
GAS WELL REGULATION AND DEHYDRATION
DISPATCHING

Write immediately and tell us your qualifications. Address your reply to:
**Industrial Relations Department**

**The Atlantic Refining Company**
**P.O. Box 2819** **Dallas, Texas**

## CAREER OPPORTUNITY FOR
## CHEMICAL ENGINEERS
***Southern California***

RESEARCH ENGINEERS Work is in the field of unit operations, with emphasis on heat-transfer and distillation. Must have advanced degree in chemical engineering and three years or more experience in unit operations, plant-design, or process development for the petroleum or chemical industries. Should be familiar with construction and operation of pilot-plants or full scale commercial units.

PROCESS ENGINEERS Prefer men with advanced chemical-engineering degree. At least two years experience in process design of petroleum refining or petro-chemical process plants. Must be able to meet customers.

Please send a detailed summary of your education, experience, and personal history. Also include a recent photo of yourself. All replies will be kept confidential. Address your letter to Personnel Department.

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## HELP WANTED

**FOREIGN and Domestic Oil Employment Directory covering the oil industry, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 3603, Tulsa, Okla.**

WANTED: Experienced engineer for domestic oil marketing in Israel. Box E-368, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED
Research and Development Engineer capable of taking charge of department with Oil Field Equipment Manufacturer. Reply giving complete resume stating age, education, experience, positions held, and salary expected. All replies confidential. Box E-346, The Oil and Gas Journal, Tulsa, Oklahoma.

**WANTED: Assistant plant manager for petroleum wax compounding plant. Experience in petroleum refining desirable together with necessary plant experience in gauging tanks, pipe work, pumping petroleum products, etc. Plant located New Jersey within 25 miles of New York City. Box E-345, The Oil and Gas Journal, Tulsa, Oklahoma.**

**WANT college graduate chemist to manage asphalt laboratory for West Coast manufacturer of petroleum products. Box E-362, The Oil and Gas Journal, Tulsa, Oklahoma.**

**WEST COAST Independent refinery wants superintendent. Desire a man with college technical education and one who has had experience in asphalt. Top job for right man. Box E-363, The Oil and Gas Journal, Tulsa, Oklahoma.**

PETROLEUM ENGINEER or technologist for secondary recovery research laboratory in eastern United States. Advanced degree or production research experience preferred. Liberal publication policy. Opportunity to gain first-hand experience in secondary recovery through coordinated laboratory and field research. Salary open. Reply giving educational background and experience. Box E-378, The Oil and Gas Journal, Tulsa, Oklahoma.

**HOUSTON OPPORTUNITY**

Experienced pipe salesman familiar with Houston area to develop sales contacts among Oil Country trade as well as Industrial, by well established local Independent Distributor. Write briefly, background experience, references and age. Good starting salary, excellent opportunity for producer. Box E-372, The Oil and Gas Journal, Tulsa, Okla.

**SALES ENGINEER**

Engineer with production experience, or experienced production man with engineering knowledge to sell and service reputable lines gas regulators, liquid meters, gas-lift equipment, with headquarters Lake Charles, or New Iberia, La. Also new opening new headquarters in Beaumont. Must be over 26 years of age, personality and appearance for sales work. Salary and commission. Automobile furnished. Please furnish detailed experience and minimum salary. **Box E-383, The Oil and Gas Journal, Tulsa, Oklahoma.**

## SITUATIONS WANTED

WANTED: Accountant-office manager position in Oklahoma City with independent. OU grad., 34. Experienced all phases accounting. Write P. O. Box 1162, or Phone 58-5756, Oklahoma City.

EXPERIENCED Production and Drilling Supt. on both Rotary and Cable Tools, Deep and Shallow wells, work over and completion, Material, Equipment, routine office duties. 39 years of age, Best reference. Box E-234, The Oil and Gas Journal, Tulsa, Oklahoma.

**FORMER Independent Oil Operator ten years, with legal education, plus eight years Wall Street experience, desires connection raise funds exploratory well drilling from excess profits taxpayers. Box D-938, The Oil and Gas Journal, Tulsa, Oklahoma.**

EXPERIENCED, practical man—Age 62. Thirty years cable tool driller, 15 years tool pusher, work over and Production Superintendent. Would like to tie in with Independent Oil Company who needs a man to work over and build up run down production. Box E-347, The Oil and Gas Journal, Tulsa, Oklahoma.

## SITUATIONS WANTED

GEOLOGIST 4 years foreign experience in subsurface exploration and development. Available immediately. Box E-339, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No 131, Ph. No. 131, Hobbs, New Mexico.

PETROLEUM ENGINEER desires foreign or domestic employment, three years experience, excellent Spanish. Box E-314, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, 6 years experience Drilling and Production, Gulf Coast area. Graduate Engineer, age 31, desires responsible position with active organization. Box E-379, The Oil and Gas Journal, Tulsa, Oklahoma.

THE POSITION YOU WANT: Oil industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

**PETROLEUM EXECUTIVE**

Experienced and trained in Modern Office Management, Petroleum Engineering, Geology, Land and Legal Dept. with 16 years well rounded experience. Now desires responsible position with aggressive oil company. Preferred location: Rocky Mt. region (based at Denver preferred). Box E-370, The Oil and Gas Journal, Tulsa, Oklahoma.

## GEOLOGIST

Presently employed. Twenty-five years experience subsurface geology and well completions. Interested in proposition from strong active independent.

**Box E-377, The Oil and Gas Journal, Tulsa, Oklahoma.**

## REAL ESTATE

IDEAL MOUNTAIN HOME: Year round completely furnished, 35 x 35 Modern 4 bedroom, bath. Large living room with fireplace, Sunroom, Dining room, Youngstown Kitchen, Basement, Garage and Oil Furnace. On Bear Creek Canyon, 23 miles from Denver. Photos on request. By owner $12,000. R. E. Byrnes, Kittredge, Colorado.

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## WYOMING RANCH

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One of the outstanding ranches in the state. 6,418 acres deeded land; 4,538 acres under irrigation, a sure-crop guarantee! 500 acres planted to wheat and barley this past year; will be planted to grasses and hay in Spring '52. The 1950 hay production was 1,728 tons. Located near Saratoga, Wyo. It carries a Taylor-right for 2,300 head for 90 days. Will easily carry 1,300 head year round. Good country to winter cattle. Has two homes for help; good modern home for owner. Corrals, garage, barns, etc. Loan on this spread at low interest can be transferred to purchaser. Plenty irrigation water plus 750-acre storage reservoir.

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## BUSINESS OPPORTUNITIES

ICC Trucking permits covering 11 Mid-Continent states valued at $100,000 for sale or trade for land or income property. Kashfinder, Wichita, Kansas.

AGGRESSIVE subsurface geologist desires to sell to smaller company that wants to find production in southern Oklahoma—a good education and ten years' experience in Ardmore. Shall expect to grow in proportion financially, as the company grows. Box E-322, The Oil and Gas Journal, Tulsa, Oklahoma.

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(FOR THE BUSY EXECUTIVE)

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## WANTED
## OIL INVESTMENT

Will buy outright or controlling interest in small oil company or oil holdings having minimum production income of $250,000. We are principals ready to invest up to $2,000,000. Best references offered and expected. Brokers protected. Write fully.

*Box E-357, The Oil and Gas Journal, Tulsa, Okla.*

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BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing. Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa 3, Oklahoma.

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## LEASE AND DRILLING BLOCKS

IF INTERESTED in leasing California Claims in San Bernardine Base and Meridian, Township 12 S. Range 16 E. Write C. W. Deming, Box 1674, Tulsa, Okla. Box 330, Waycross, Ga.

WANTED: Oklahoma or North Texas drilling deal with merit. Not over 4500'. Give full details in first letter. Box E-356, The Oil and Gas Journal, Tulsa, Oklahoma.

BLOCK of 3600 acres in New Mexico. Geological reports favorable. Correspondence invited from Parties interested in developing this acreage. Zeke Morse, 2525 South Spaulding, Los Angeles, California.

WATER FLOOD PROPERTY AVAILABLE
250 acres, full 7/8 leases, North Central Texas—900' to 1,000' deep. Sand production, 11 wells now producing. Estimated 20 proven undrilled locations. Ample supply salt water available from shallow sand on property. Pipe line connection—Electrically operated. Box E-360, The Oil & Gas Journal, Tulsa, Oklahoma.

MINERAL lease available approximately 246 acres in northeast quarter, Section 31, Town 7, Range 3, in Marshall County, Oklahoma. H. W. Hammer, 111 West Monroe Street, Chicago 3, Illinois.

FOR SALE: Oil & Gas Leases in Barnes Griggs Pierce McLean and Mountrail Counties, North Dakota. Write E. G. Ranum, Valley City, N. Dak.

FOR SALE: Federal and State Oil Leases, Twp. 23 N-5E; Twp. 24 N-5E; Twp. 21 N-5W; Twp. 17N-3W; Twp. 15N-1E; New Mexico P. M. About 255 acres. 10220 Kilarney, Dallas, Texas.

EXPERIENCED, retired Oil Field Superintendent will help finance, drill and promote shallow leases. Box E-348, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Oil and Gas Leases adjoining producing leases, also wildcat leases, drilling propositions and small producing properties; all in shallow territory. W. P. Harley, Bowling Green, Ky.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

**DRILLING DEALS — WEST TEXAS**

We are in position to offer drilling deals on good geology to independents and companies. Will furnish complete data upon request. Reply:

**Box E-333, The Oil and Gas Journal, Tulsa, Oklahoma.**

LEASES ROYALTIES
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Unitized gas field producing 4-5 million cubic feet gas per day with liquid content 5 gallons per thousand or more. Operator has complete plant ready to move on site.

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## FOR SALE—MAPS

NORTH DAKOTA MAPS—Base Map of North Dakota: County outline, Township and Range, location of wells and Operators name with total depths. Oil and Gas Fields. 1" = 8 miles. Price $5.00. COUNTY MAPS: Fee ownership and lease with expiration dates. Scale 1" = 4,000 Ft. Northwest Mapping Co., 1171½ Fourth St., Bismarck, North Dakota.

**FINANCING**

YOUR FINANCING PROBLEM can be solved at moderate cost. For details write Box E-241, The Oil and Gas Journal, Tulsa, Oklahoma.

**WANTED**

EQUIPMENT and supply lines. Manufacturers representative starting new operation needs additional lines. Covering Okla. and S.E. Kans. oil industry. Box E-366, The Oil and Gas Journal, Tulsa, Oklahoma.

## Canadian Fields

(Continued from page 152)

daily. Pipe recovery during the 1-hour test was 20 ft. of water, while shut-in pressure was 1,200 psi. The crew is now coring another 10-ft. interval for further tests.

British American Oil Co. is preparing to complete its South Calmar discovery after opening up 15 ft. of D3 oil pay and not encountering water in that reef. The joint B.A.-Cities Service Petroleum Co.'s oil strike in the Clive area is being plugged back for completion in the D2 after finding water in the D3 horizon.

The South Calmar well, B.A.-South Calmar 6-2, is located in LSD 6, 2-49-27w4, 3 miles northeast of the Texaco-McColl-Wizard Lake Cretaceous, D2 and D3 Devonian oil discovery. Revised D3 contact is 6,187 ft., or 2,709 ft. subsea. A drill-stem test from 6,188-6,202 ft. gave a gas flow in 6 minutes, at the rate of 277,000 cu. ft. daily, and an oil flow in 19 minutes. Pipe recovery during the last 40-minute test was 3,000 ft. of oil and drilling mud. String of 7-in. production casing was set at 6,188 ft. prior to deepening in the D3, and this well is being completed at bottom 6,202 ft., with 14 ft. of the D3 open.

The D2 oil discovery at Clive, located some 95 miles north-northeast of Calgary and 12 miles east of Lacombe, will be plugged back from production from the D2 Devonian zone, after finding the D3 horizon water-loaded. The well found about 12 ft. of D2 oil zone before encountering water, and completed drilling at 6,421 ft. This discovery, B.A.-Cities Service-Clive 1, is located in LSD 13, 16-40-24w4.

California-Standard Co., an American firm which is carrying out the largest exploratory and development program of any one company in Southwest Manitoba, has staked site for another exploratory venture, the company's eighth well in that province. Earlier this year Cal-Standard chalked up a limestone discovery of 33° gravity crude oil at a Virden wildcat. Oil has been found at three follow-up ventures, and drilling is under way at a 4-mile northwest stepout. In an expanded exploratory program, the company currently has five seismographs and a gravitymeter working on its Manitoba holdings.

The new test is Cal-Standard-Hargrave 15-16, in LSD 15, 16-11-27w1, about 6 miles north-northeast of the Virden well, 9 miles northwest of Virden town, and 15 miles east of the Saskatchewan border. It is scheduled to go to about 3,000 ft.

Meanwhile, Cal-Standard's discovery well, Daly 15-18, is on steady pump production and making around 6 bbl. daily. The first follow-up, ¼ mile to the south, Daly 10-18, is pumping at the rate of 8 bbl. per day. Water cut at both these wells is averaging 2 per cent.

The company's 1½-mile southwest extension success and ¼-mile offset to that extension are expected to prove to be considerably better producers than the initial two wells. The extension, Daly 7-12, is not yet on steady pump production, but crew is cleaning out hole preliminary to production testing. A quarter mile south of that venture, Daly 2-12, completed drilling at 2,352 ft., and on flush pump runs was averaging about 80 bbl. of clean oil daily. No water showed. A 4-mile northwest stepout, Daly 8-29, is currently making hole at 2,980 ft.

# EQUIPMENT MEN

*(Continued from page 158)*

## BJ Appoints Sutton Service Engineer

*M. T. SUTTON*

Max T. Sutton has been appointed service engineer for the Houston office of the oil tool division, Byron Jackson Co., according to an announcement by Ben A. Hilliard, sales manager of the division.

Sutton was formerly employed by Humble Oil & Refining Co., and has had considerable oil-field experience in drilling and production.

## Heap Equipment Will Represent Exner-Dodge

Exner - Dodge, Inc., Coffeyville, Kans., has announced the appointment of H. H. (Hub) Heap, Jr., with The Heap Equipment Co., Odessa, Tex., to represent Exner-Dodge in the West Texas and New Mexico area.

A full stock of swaged nipples, packers, and other Exner - Dodge products are being carried in warehouse stock at Odessa.

## New Wichita Plant Delivers First Chemicals

***Frontier Chemicals of Kansas, Inc., the new Wichita chemical plant, recently made delivery of its first load of chemicals produced to the Derby Oil Refinery. Above are: Curtis W. Cannon, president of the chemical company; F. W. McCurry, vice president of Derby; H. M. Van Auken, manager, Wichita Chamber of Commerce; Eddie Jones, Derby refinery superintendent; Harry Bilson, purchasing department, Derby; and C. M. Thompson, vice president, Frontier Chemicals sales department.***

## Truck Mounted Compressors Used With Drilling Rigs

***Where water supply for mudding is not readily available, Failing Exploration Co. and Humble Oil & Refining Co. are using compressed air to blow the cuttings from holes drilled for seismographic exploration. The Jaeger compressor used has a rated capacity of 250 cu. ft. per minute of air at 100 psi., which enables it to maintain the 30 to 40-psi. gage pressure needed to eject cuttings from 5-in. holes drilled from 30 to 40-ft. depths. A 2-in. air line connects to the drill stem. The two companies jointly operate a fleet of these truck-mounted compressors which travel with rotary rigs. This compressed-air method is coming into use by both oil and gas-exploration crews in sections of Texas, Colorado, and other prospecting areas where it is costly or impossible to obtain water.***

## McMeans Is Representative For Republic Flow Meters

Republic Flow Meters Co., Chicago, has announced the appointment of Fred McMeans & Co. as its exclusive engineering and sales representative in the Province of British Columbia to supply heat and power equipment for industrial applications and to supply field service in that district.

McMeans is a graduate of University of British Columbia in mechanical engineering. His experience includes 2 years as engineer at the plant of a large cement company; for some time he was a maintenance supervisor in an extensive oil refinery.

Another Republic release announces the opening of its new Seattle district office, which district includes the states of Washington, Oregon, and the Panhandle of Idaho and Alaska.

Henry Weber, a graduate mechanical engineer, has been named as district manager. Before joining Republic he was an efficiency engineer with Consolidated Edison Co. of New York. He served as senior field engineer, chief service engineer, and assistant chief project engineer for Republic before joining the new Seattle district office.

## Central Area

(Continued from page 152)

Lawrence County: Big Four Oil & Gas Co and Hayes Drilling Co. 1 Fearheiley, SE SE NW 27-4n-13w, dry, TD 2,263 ft.

Richland County: Don Slape 1 Herman, SE NE SW 4-3n-10e, dry, TD 3,155 ft.

Calvert Drilling Co., Inc., 1 Cooper, NE SW SE 7-4n-9e, dry, TD 3,070 ft.

J. E. Black Oil Co. 1 Virgle Royce Community, NE NW SE 31-4n-10e, dry, TD 3,043 ft.

Wayne County: D. H. Bolin 1 Stanton, NE SW SW 16-3s-8e, dry, TD 3,499 ft.

### INDIANA WILDCAT FAILURES

Dubois County: Bury Drilling Co. 1 Smith, N½ NE SW NE 10-1s-3w, dry, TD 1,004 ft.

Gibson County: Noah Petroleum Co. 1 Kissell, NW NW SE 36-2s-10w, dry, TD 1,980 ft.

Winmar Oil Co. 1 Smith, SE SE SW 4-3s-11w, dry, TD 2,475 ft.

F. B. Drilling Co. 1 Dyke, NE NE SW 25-2s-13w, dry, TD 2,770 ft.

Aurora Gasoline Co. 1 Mauck Community, SW SW NE 10-3s-12w, dry, TD 2,665 ft.

Knox County: Lohman & Johnson 1 Blake-Stafford, Military Donation 226-2n-8w, dry, TD 1,501 ft.

Skiles Oil Corp. 1 Oexman, NW SE NW 3-1n-9w, dry, TD 1,637 ft.

G. C. Parker 1 Carnahan, Military Donation 154-3n-8w, dry, TD 1,342 ft.

Olds Oil Co. 1 McClure, Military Donation 20-3n-9w, dry, TD 1,746 ft.

Circle Drilling Co. 1 Kixmiller, Military Donation 97-4n-9w, dry, TD 1,703 ft.

Posey County: A. J. Slagter, Jr., 1 Vail, NE SW NW 2-4s-13w, dry, TD 2,966 ft.

Calvert Drilling, Inc., 1 Hungate, NE NE NE 23-4s-13w, dry, TD 3,013 ft.

W. H. Krohn 1 Simmons, NW NE SE 15-5s-12w, dry, TD 2,817 ft.

Lynch Oil Co. 1 Miller et al, C SE SE 7-6s-13w, dry, TD 2,914 ft.

Baron Kidd 1 Gentry, SW NW SE 3-6s-14w, dry, TD 3,077 ft.

Buchman & O'Neal 1 Culley, NE NW SE 8-6s-14w, dry, TD 3,033 ft.

C. E. Brehm 1 Spencer-Vogel, SE SW NW 33-6s-14w, dry, TD 2,978 ft.

Vigo County: Reed & Lowers 1 Sankey, SE SW SW 9-11n-8w, dry, TD 930 ft.

### MICHIGAN WILDCAT FAILURES

Allegan County, Allegan Township: Sheldon-Stewart Co. 2 Holthof, SW SW SW 14-2n-13w, Traverse 1,423 ft., dry, TD 1,427 ft.

Heath Township: Ford Oil Co. 1 VerBurg & Garveling, SW SE NW 20-3n-14w, Traverse 1,422 ft., dry, TD 1,460 ft.

Carl C. Goff 1 Sawyer, NW SW SE 24-3n-14w, Traverse 1,480 ft., dry, TD 1,571 ft.

Chippewa County, Rudyard Township: Charles W. Jetter 1 Mattson, SE SW SW 8-44n-2w, dry, TD 777 ft. in Lake Superior sand.

Huron County, Bloomfield Township: Graham Wilcox 1 McDonald, SE NE NE 20-17n-14e, Traverse 1,430 ft., dry, TD 1,450 ft.

Mason County, Hamlin Township: Augie Busk 1 Bartlett et al, SW NW NW 29-19n-18w, Traverse 1,291 ft., dry, TD 1,305 ft.

Montcalm County, Bloomer Township: McClure Oil Co. 1 Eagen, SE SW NE 18-9n-5w, Traverse 2,707 ft., dry, TD 2,775 ft.

Douglass Township: P. E. Glendenning 1 Hillis, NW NW SW 24-11n7w, Dundee 3,377 ft., dry, TD 3,423 ft.

Eureka Township: Granville C. Berlin 1 Sackett, SE NE SE 2-9n-8w, Dundee 3,128 ft., dry, TD 3,260 ft.

Otsego County, Hayes Township: Brazos Oil & Gas Co. 1 Janney, NE NE NW 24-29n-4w, dry, TD 3,618 ft. in Richfield.


### LEGAL

U. S. DEPARTMENT OF THE INTERIOR. Bureau of Land Management, Washington 25, D. C. Notice is hereby given that the W½NW¼ sec. 22, T. 57 N., R. 101 W., 6th P.M., Wyoming, within the known geologic structure of the Badger Basin field, will be offered in one parcel for oil and gas leasing through competitive bidding, to the qualified bidder of the highest cash amount per acre, at 1 p.m., Eastern Standard Time, October 31, 1951, when bids will be opened. Details of the lease offering and how and where to file bids, may be obtained by addressing an inquiry to the Manager of the Land and Survey Office, Cheyenne, Wyoming, or to this office. Marion Clawson, Director.

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| American Iron & Machine Works Co. | 78 |
| American Optical Company | 17 |
| Anchor Coupling Co., Inc. | 105 |
| Anchor Petroleum Company | 42 |
| Anglo-Iranian Oil Company, Limited | 95 |
| Baash-Ross Tool Company | 125 |
| Baird Mfg. Co. | 142 |
| Bakelite Company, A Division of Union Carbide and Carbon Corporation | 33 |
| Baker Oil Tools, Inc. | 44 |
| Baldwin-Lima-Hamilton | 116 |
| Beacon Petroleum Company | 132 |
| Beech Aircraft Corp. | 6 |
| Bethlehem Steel Co. | 1 |
| Boyles Galvanizing Company | 139 |
| Butler Manufacturing Co. | 89 |
| Byron Jackson Co. | 142 |
| Cameron Iron Works, Inc. | 106, 107 |
| Carbide & Carbon Chemical Company, A Division of Union Carbide and Carbon Corporation | 24 |
| Chapman Valve Mfg. Co., The | 12 |
| Chemical Construction Corporation | 28 |
| Chicago & Southern Air Lines | 146 |
| Chicago Pneumatic Tool Company | 96, 97 |
| Classified Advertising | 159 to 164 |
| Coffing Hoist Company | 127 |
| Core Laboratories, Inc. | 110 |
| Crane Co. | 5 |
| Crose Manufacturing Co., Inc., M. J. | 130 |
| Crutcher-Rolfs-Cummings | 128 |
| Dean Brothers Pumps, Inc. | 135 |
| De Laval Steam Turbine Co. | 18 |
| Delta Engineering Sales Co. | 133 |
| Detroit Diesel Engine Division, General Motors Corp. | 13 |
| Dia-Log Company, The | 83 |
| Dowell Incorporated | 141 |
| Dresser Industries, Inc. | 36, 64 |
| Dresser Manufacturing Division | 36 |
| Drilling & Service, Inc. | 147 |
| du Pont | 9, 10 |
| Eagle-Picher Lead Co. | 35 |
| Empire Trust Company | 112 |
| Fabick Tractor Company, The John | 131 |
| Federated Metals Division, American Smelting and Refining Company | 146 |
| Fisher Governor Company | 32 |
| Fluor Corporation, Ltd., The | 129 |
| Ford Alexander Corporation, The | 83 |
| Foster Wheeler Corp. | 91, 92 |
| Foxboro Company, The | 26 |
| Frisco | 127 |
| Goodrich Company, B. F. | 3 |
| Gordon Co., Claude S. | 145 |
| Grancell, I. H. | 151 |
| Gulberson Corporation | 136 |
| Gunite Concrete & Construction Co. | 134 |
| Halliburton Oil Well Cementing Co. | 87 |
| Harbison-Fischer Mfg. Co. | 149 |
| Hartzell Propeller Fan Co. | 67 |
| Hilliard Corporation, The | 152 |
| Hughes Tool Co. | Back Cover |
| Jones & Laughlin Supply Co. | 15 |
| Justrite Manufacturing Co. | 135 |
| Kenyon & Sons, Ltd., William | 100 |
| Koch Engineering Company, Inc., The | 114 |
| Ladish Co. | 101 |
| Lane-Wells Company | Inside Front Cover |
| Larkin Packer Company, Inc. | 37 |
| L-K Pump Valve Co. | 126 |
| Manhattan Rubber Division, Raybestos-Manhattan, Inc. | 21 |
| Manning, Maxwell & Moore, Inc. | 14 |
| Mayo Hotel, The | 126 |
| McCord Corporation | 128 |
| McKissick Products Corporation | 103 |
| McNamar Boiler & Tank Co. | 98 |
| Mechanical Equipment Co., Inc. | 63 |
| Middle West Coating & Supply | 109 |
| Midwest Piping & Supply Co., Inc. | 8 |
| Mission Mfg. Company | 34 |
| Modern Engineering Co., Inc. | 109 |
| Moon Brothers, Ltd. | 148 |
| Murphy Diesel Company | 2 |
| National Airoil Burner Co., The | 134 |
| National Tank Company | 168 |
| Nicolet Industries, Inc. | 109 |
| Norris Brothers, Inc. | 109 |
| Norris Manufacturer, Inc., W. C. | 40 |
| Oil and Gas Journal, The | 80, 81 |
| Oil Base, Inc. | 39 |
| Oil Capitol Supply Co. | 134 |
| Oil Center Tool Co. | 144 |
| Oil Well Supply Co. | 4 |
| Owens-Illinois Glass Co., Kaylo Division | 86 |
| Pacific Pumps, Inc. | 111 |
| Paris Distributor, Inc., Henry H. | 135 |
| Parkersburg Machine Company | 124 |
| Parkersburg Rig & Reel Co. | 102 |
| Penberthy Injector Co. | 71 |
| Perrault Brothers | 129, 145 |
| Petroleo Interamericano | 90 |
| Petroleum Distributing Co. | 126 |
| Petroleum Electric Power Assn. | 16 |
| Raybestos-Manhattan, Inc., Manhattan Rubber Division | 21 |
| Reed Roller Bit Company | 77 |
| Republic Flow Meters Co. | 20 |
| Republic Steel Corporation | 27 |
| Rockwell Manufacturing Company | 29 |
| Ross-Martin Co. | 145 |
| Security Engineering Co., Inc. | 64 |
| Shaffer Tool Works | 88 |
| Shand & Jurs Co. | 120 |
| Skinner Company, M. B. | 134 |
| Southern Mill & Mfg. Co. | 150 |
| Standard Oil Co. of California | 19 |
| Standco Brake Lining Co. | 126 |
| Superior Iron Works & Supply Company, Inc. | 7 |
| Taylor Forge & Pipe Works | 118 |
| Thermo Electric Co., Inc. | 148 |
| Thomas Flexible Coupling Co. | 143 |
| Timken Roller Bearing Company | 11 |
| Tri-Clover Machine Co. | 105 |
| Union Carbide and Carbon Corporation, Bakelite Company | 33 |
| Union Carbide and Carbon Corporation, Carbide & Carbon Chemicals Company | 24 |
| United States Gypsum Co. | 87 |
| United States Rubber Company | 30 |
| U. S. Steel Corp. Subsidiaries | 4 |
| United Supply & Manufacturing Co. | 85 |
| Visco Products Co., Inc. | 61 |
| Wagner Electric Corporation | 23 |
| Wait Mfg. Co. | 129 |
| Wallace & Tiernan Products, Inc. | 38 |
| Warner Lewis Company | 129 |
| Warren Automatic Tool Co. | 127 |
| Warren Petroleum Corporation | Front Cover |
| Wood's Sons Co., T. B. | 129 |
| Wyatt Metal & Boiler Works | 31 |
| Youngstown Sheet and Tube Company | Inside Back Cover |



### LEGAL

U. S. DEPARTMENT OF THE INTERIOR. Bureau of Land Management, Washington 25, D. C. Notice is hereby given that two tracts of land totalling approximately 240 acres, in T. 29 N., R. 81 W., 6th P.M., Wyoming within the known geologic structure of the Bolton Creek field, will be offered for oil and gas leasing, through competitive bidding to the qualified bidders of the highest cash amounts per acre, at 1 p.m., Eastern Standard Time, October 31, 1951, when bids will be opened. The details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to the Manager of the Land and Survey Office, Cheyenne, Wyoming, or to this office. Marion Clawson, Director.

### LEGAL

U. S. DEPARTMENT OF THE INTERIOR. Bureau of Land Management, Washington 25, D. C. Notice is hereby given that two tracts of land totaling approximately 135 acres in T. 19 S., R. 15 E., M.D.M., California, within the known geologic structure of the Coalinga East Side field, will be offered for oil and gas leasing, through competitive bidding to the qualified bidders of the highest cash amounts per acre, at 1 p.m., Eastern Standard Time, October 10, 1951, when bids will be opened. The details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to the Land Office at Sacramento, or to this office. Marion Clawson, Director.


TABLE OF CONTENTS ON PAGE 43

# CUBIC FEET

This National Indirect Heater has processed over one billion cubic feet of high pressure gas in its nine years of service!

The greatest application of these heaters is heating high pressure gas for the prevention of hydrates where pressure reduction is necessary.

The total upkeep and cost of water supply in nine years has been zero. In particular, this is a properly engineered piece of equipment typical of National Tank Company products throughout.

## NATIONAL TANK COMPANY

TULSA, OKLAHOMA

# 26 MILLION TONS of steel scrap "ain't hay"

IT took 57,000 tons of steel to build the Empire State Building in New York. That's about one-tenth of one percent of the tonnage of scrap required to produce the new steel demanded for America's defense and civilian needs this year.

Half of this scrap is produced by the steel mills themselves. The other half - approximately 26 million tons - must be supplied by the public. That tremendous tonnage is the equivalent of 461 Empire State Buildings - over 1400 carloads of scrap every day of the year.

Right now there is a scrap shortage. It threatens to interfere with steel production. So we appeal to you, as a user of steel and steel products, to do all you can personally to help collect scrap.

Somewhere in your place of business - and even at home - there are things that can be scrapped - worn-out or obsolete machines, pipe, boilers, tools, structural parts, etc., that you'll never use again in their present form. Turn them in through regular channels. Call the nearest dealer and start your scrap on its way to the steel mills - to help America reach its production goal of 105 million tons of new steel in 1951. It is this team-work that will help us win the victory again.

YOUR SCRAP V YOUNGSTOWN IS NEEDED

## The Youngstown Sheet and Tube Company

General Offices--Youngstown 1, Ohio
Export Offices--500 Fifth Avenue, New York
MANUFACTURERS OF CARBON ALLOY AND YOLOY STEELS

The steel industry is using all its resources to produce more steel, but it needs your help and needs it now. Turn in your scrap, through your regular sources, at the earliest possible moment.

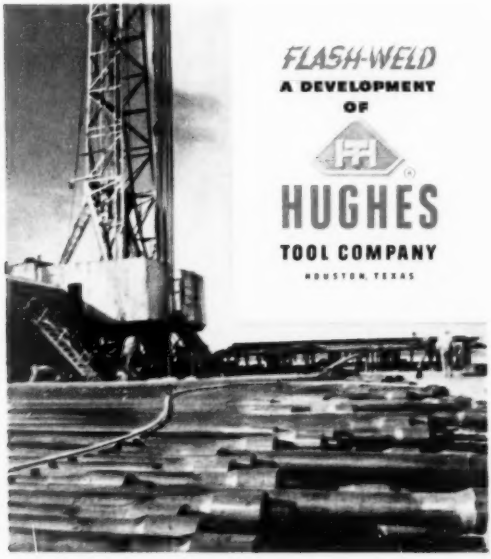
# Are you Discarding Salvageable Drill Pipe?

In these days of drill pipe shortages, it may pay you to take a second look before discarding your pipe.

Many operators are now making hole with pipe reclaimed from castoff strings through the use of HUGHES Flash-Weld Tool Joints. These joints eliminate threaded pipe connections and make it possible to incorporate many different types of pipe in a single string. As a result, drill pipe that otherwise would not be used, is now being salvaged.

*Regardless of pipe end design, any good drill pipe—with sufficient upset—can be converted into a uniform, dependable drill stem by using HUGHES Flash-Weld Joints.*

Ask your local HUGHES representative about the cost of unitizing your drill pipe remnants with HUGHES Flash-Weld Tool Joints...the tool joints with the proven performance record!



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